the OIL AND GAS JOURNAL

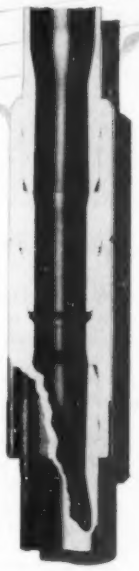
Here is one reason why

REED TOOL JOINTS

last longer

REED specifications for tool joint steel call for a perfect balance of alloys and of the carbon content to produce a steel with better properties than that obtained from the American Iron and Steel Institute specifications, based on chemical and hardenability requirements only.

Fine steel is just one of the many important reasons why **REED** Tool Joints last longer.



REED ROLLER BIT COMPANY

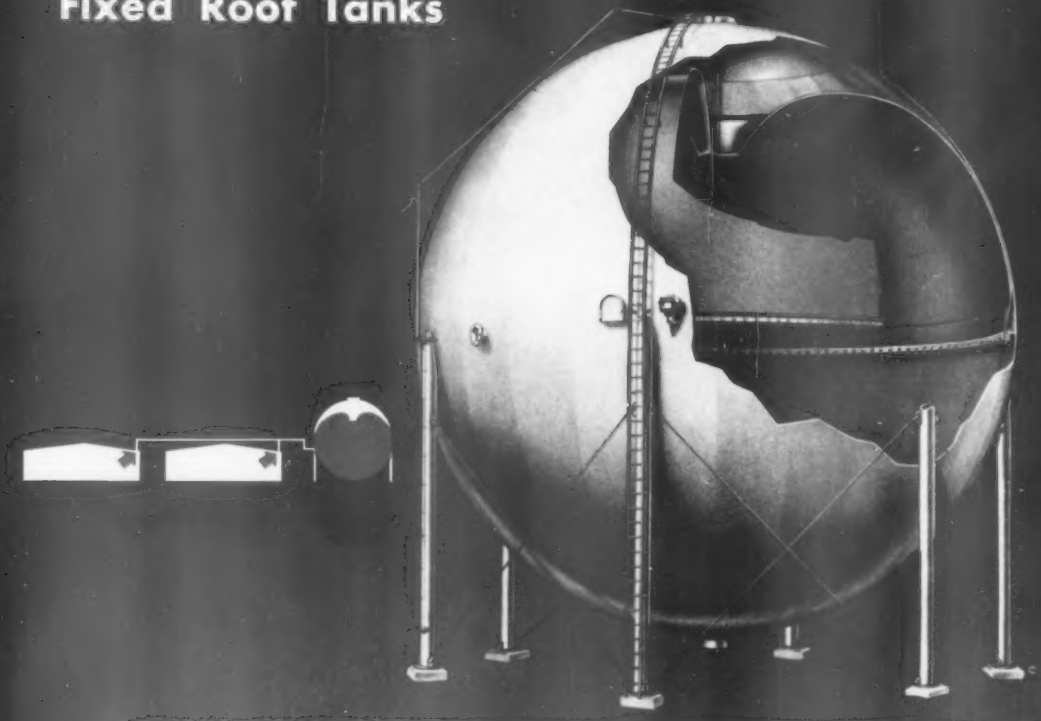
HOUSTON 1, TEXAS

Gulf Coast, Mid-Continent, Rocky Mountain and Canadian Distributor for Martin-Decker Products

PRICE 50 CENTS TABLE OF CONTENTS PAGE 1 JUNE 9, 1952

THE *IMPROVED* HORTON VAPORSPHERE

Reduces Evaporation Losses From Fixed Roof Tanks



Service

Horton Vaporspheres are used to reduce evaporation losses at tank farms, pipe line terminals, refineries, bulk stations and marine terminals. Vaporspheres cut down losses from interconnected fixed-roof tanks by providing temporary storage space for displaced vapor.

The low pressure at which the Vaporsphere operates makes it well suited for use in vapor-saving systems serving storage tanks with cone-roofs that will only stand pressures of an ounce or two per square inch.

Construction

The improved Horton Vaporsphere consist of a spherical steel shell of welded construction. Inside the shell is a flexible hemispherical membrane, the outer edge of which is connected to the shell at its equator. Displaced vapor is stored under the membrane. The space above has an open vent to allow air to flow in and out.

The membrane in the Vaporsphere is made of a tough, durable fabric, coated on both sides with impervious petroleum-resistant synthetic rubber.

Operation

The Horton Vaporsphere is connected to the vapor spaces of one or more fixed-roof tanks by light, large diameter piping. (See diagram). Vapor forced out of the fixed-roof tanks—either by breathing due to increased temperature or by displacement caused by filling—flows through the vapor lines into the Vaporsphere. These vapors return to the tanks when conditions which caused their displacement are reversed.

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THE OIL AND GAS
JOURNAL
Vol. 51, No. 5

CONTENTS FOR JUNE 9, 1952

NEXT WEEK

• THE ANNUAL GULF COAST NUMBER. This issue will feature a 20-page staff roundup of activity in all branches of the oil industry in the Gulf Coast area. It will also feature many contributions from authors in the industry, the discussions covering all phases of development. In addition, there will be another of the Journal's multicolor wall maps, of the entire Gulf Coast region, brought completely up to date, and listing names and locations of more than 1,800 fields, all refineries, natural-gasoline and cycling plants.

REGULAR DEPARTMENTS

They Say ... 36
Calendar of Events ... 37
Journally Speaking ... 41
Editorial ... 43
This Week ... 45
Watching Washington ... 51
International News ... 57
Personals ... 63
Deaths in the Industry ... 67
On the Job ... 97
Engineering Reference ... 103
Modern Drilling ... 105
Progress in Metals ... 107
Engineering Fundamentals ... 109
Refiner's Notebook ... 111
Corrosion Control ... 113
Equipment Digest ... 115
Drilling Contractors ... 119
Active Rotary Rigs ... 120
Pipe-Line News ... 123
Refining News ... 129
Natural-Gas News ... 131
Natural-Gasoline News ... 131
Exploration Statistics ... 150
Production Statistics ... 151
Refining Statistics ... 152
Market Statistics ... 153
Equipment Men in News ... 155
Classified Advertising ... 157
Advertisers' Index ... 161

EXPLORATION—DEVELOPMENT

Today's Promise of Geophysics 133
Hightlights of Week ... 133
Reports by Areas ... 134

NEWS FEATURES

War Would Mean Serious Product Shortages, Davis Tells S.A.E. ... 46
"Hot" Rings Give Quick, Accurate Measure of Engine Wear, S.A.E. Told ... 47
New $30,000,000 Exploration, Production Firm Being Formed in Houston ... 47
Demands Growing for Better Waste-Disposal Systems, Processors Hear ... 48
Process Engineers Must Know Instrumentation and Automatic Control ... 49
Contractor's Accounting Methods May Mean Profit-Loss Difference ... 49
Senate Expected to Try Override of Tidelands Veto This Week ... 50
Steel Strike Again Clouds Short-Range Outlook for Oil Industry ... 50
OPS Again Rebuffs I.P.A.A. in Its Bid for Decontrol of Prices ... 51
Battle Looms Over Level of Crude-Oil Production in Texas ... 52
Unusual Problems Require Use of Special Features in Ringwood Plant ... 53
Geologists, Geophysicists Pool Talents for Oil-Finding Efficiency ... 54
Oil Accumulates in Structures With No Barrier to Updip Migration ... 55
Louisiana Legislature Moves to Assure Uniform Gas Price ... 55
PAD Head Says Refinery Runs Must Be Stepped Up Due to Oil Strike ... 56
New Firm Spuds in 6,500-Ft. Test in Inland Washington ... 56
Romanian Production Still Dropping; Hungary's Outlook Dim, Too ... 57
Slump in Tanker Rates Responsible for Attempts to Move Iran's Oil ... 60

ENGINEERING-OPERATING FEATURES

Extractive Distillation of High-Purity Aromatics ... 68
A discussion of the application of Shell's new process for the production of nitration-grade aromatics. By C. L. Dunn and G. E. Liedholm, Shell Development Co.

How to Combat Circulation Loss ... 71
Here's an analysis of the ways in which lost circulation occurs, and some suggested methods of alleviating the problem. By W. C. Goins, Gulf Oil Corp.

A 40-M.P.H. Servicing Unit Operating in Cuyama Valley ... 76
Description of a self-propelled rig, weighing 28 tons, that has satisfactorily met all field requirements. By D. H. Stormont, Journal's West Coast district editor.

Indiana's Largest Active Water Flood ... 80
The amazing Berry Skelton secondary-recovery project produces 1 out of every 13 bbl. of oil coming from the whole state.

Petrochemicals from Ethane and Propane ... 86
Description of Mathieson Chemical Corp.'s new plant at Doe Run, Ky., which produces ethylene glycol.

Odin Water-Flood Project, Marion County, Illinois ... 94
This project has been responsible for an increase in reduction of from less than 100 bbl. to over 1,200 bbl. daily. By Leon Krause, Ashland Oil & Refining Co.

On the Job . . . In the Plants ... 97
On the Job . . . In the Fields ... 99
Engineering Reference Section ... 103
Modern Drilling ... 105
Progress in Metals ... 107
Engineering Fundamentals ... 109
Refiner's Notebook ... 111
Corrosion Control ... 113
Oil and Gas Equipment Digest ... 115

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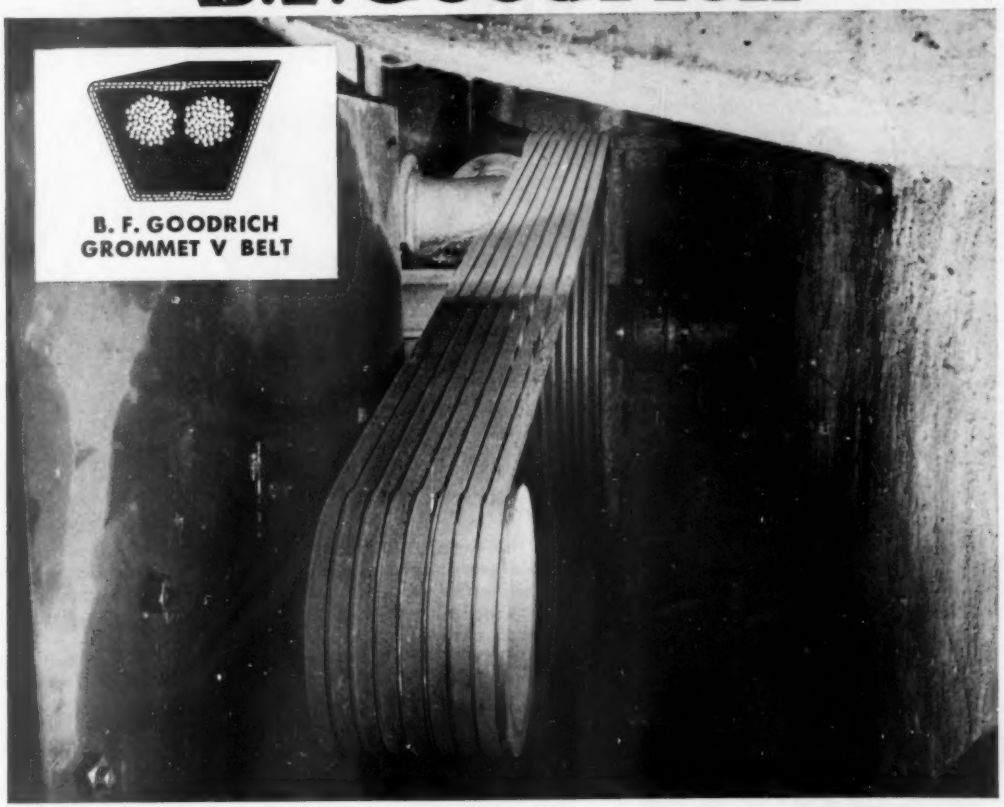

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"Locked Liner" and "Skirt Plunger"

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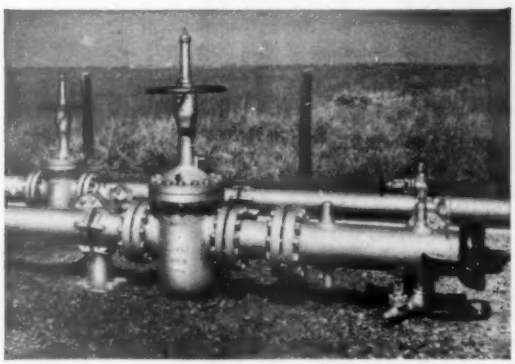
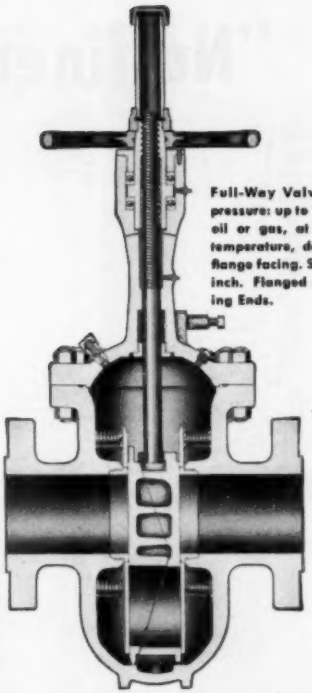
For further information, see your Crane Representative or write for Circular AD-1864. No obligation.



Crane cast steel pipe-line gate valves on scraper trap in crude oil lines.



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Hilton Drilling Company

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This is the second Murphy powered rig we have owned and the Hilton Drilling Company, Inc., and its employees think that there are no finer engines built. Mr. Tom Cook, drilling superintendent for the Hilton Drilling Company, Inc., expresses his thoughts of the Murphy Diesel engines this way, "The Murphy engines are in my opinion the most economical, practical, long-lived engines in use in the drilling industry today. We are very proud of our Murphys and Murphy engines will be on any rigs owned by this company in the contemplatable future."

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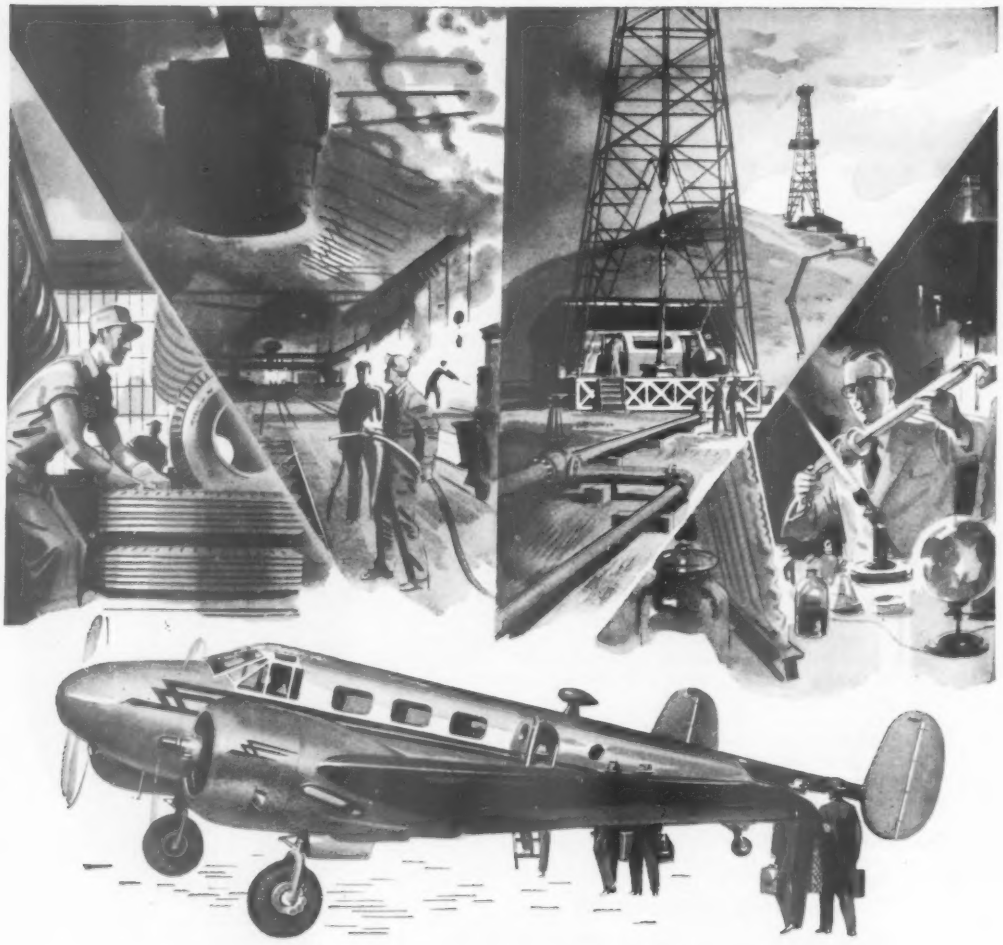

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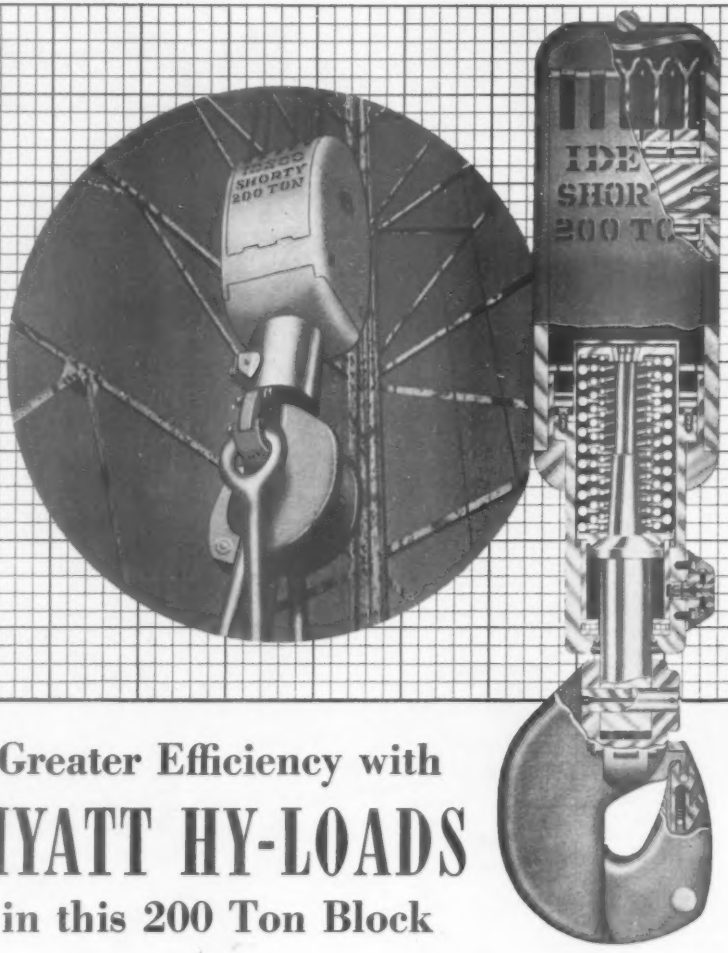

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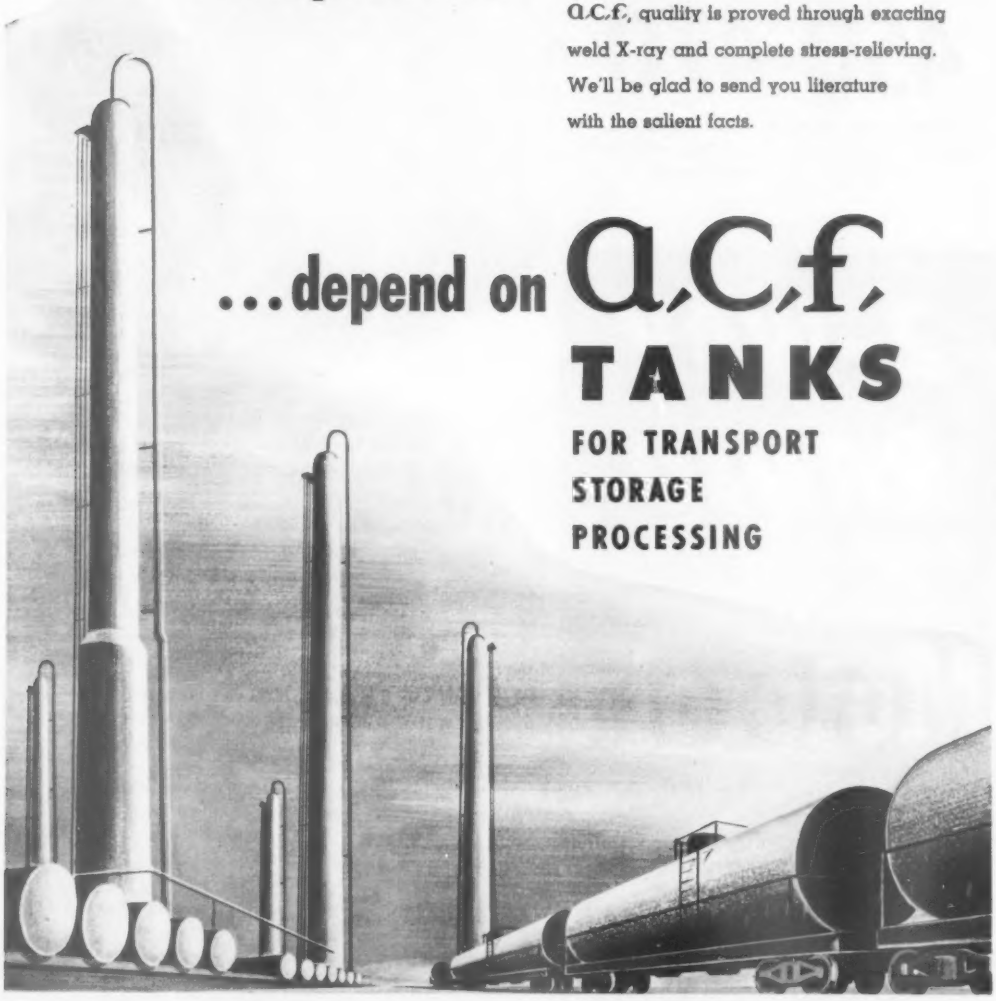

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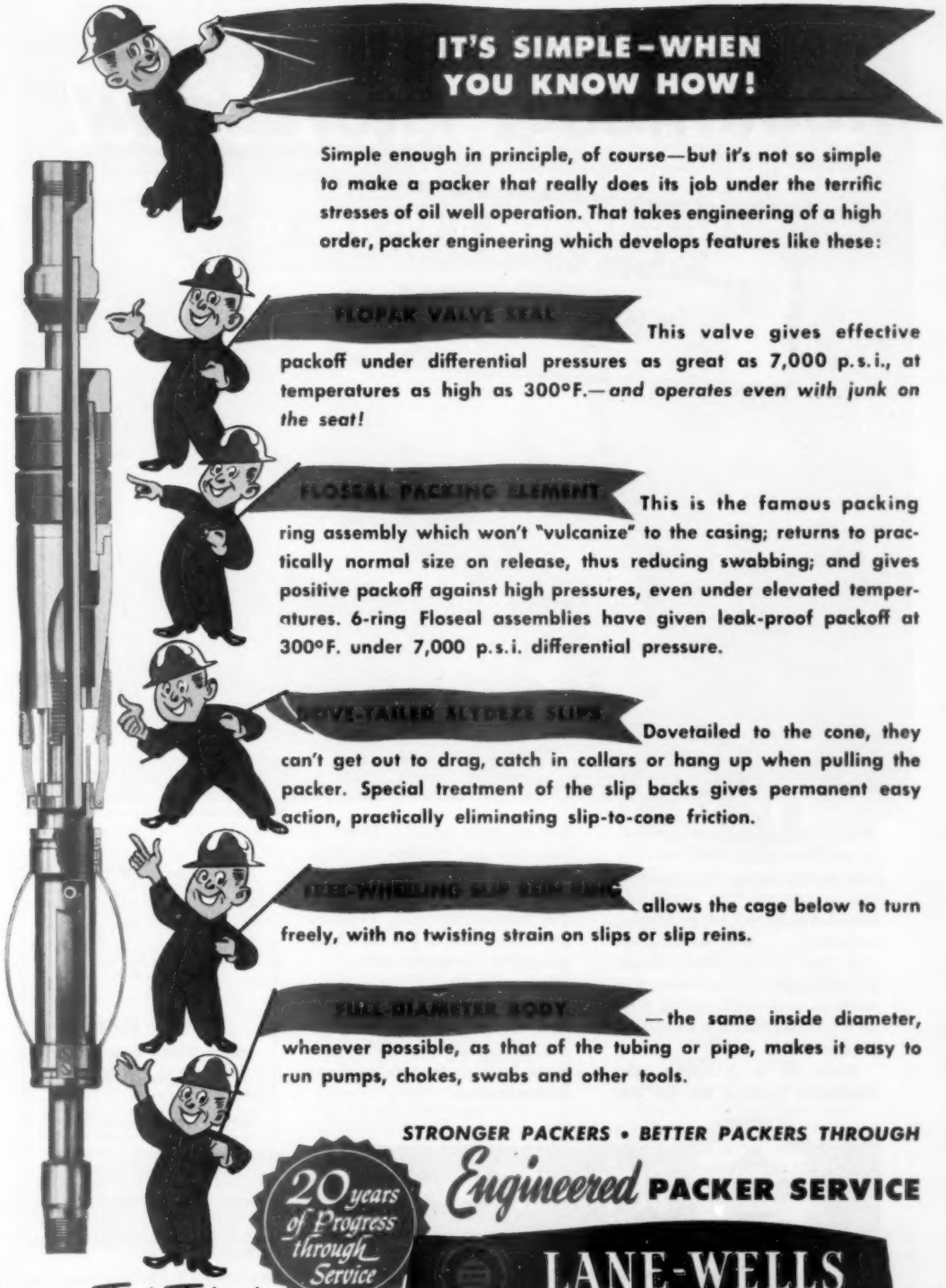


IT'S SIMPLE—WHEN YOU KNOW HOW!

Simple enough in principle, of course—but it's not so simple to make a packer that really does its job under the terrific stresses of oil well operation. That takes engineering of a high order, packer engineering which develops features like these:

FLOPAK VALVE SEAL This valve gives effective packoff under differential pressures as great as 7,000 p.s.i., at temperatures as high as 300°F.—*and operates even with junk on the seat!*

FLOSEAL PACKING ELEMENT This is the famous packing ring assembly which won't "vulcanize" to the casing; returns to practically normal size on release, thus reducing swabbing; and gives positive packoff against high pressures, even under elevated temperatures. 6-ring Floseal assemblies have given leak-proof packoff at 300°F. under 7,000 p.s.i. differential pressure.

DOVE-TAILED ALYDEZE SLIPS Dovetailed to the cone, they can't get out to drag, catch in collars or hang up when pulling the packer. Special treatment of the slip backs gives permanent easy action, practically eliminating slip-to-cone friction.

FREE-WHEELING SLIP SECTION allows the cage below to turn freely, with no twisting strain on slips or slip reins.

FULL DIAMETER BODY —the same inside diameter, whenever possible, as that of the tubing or pipe, makes it easy to run pumps, chokes, swabs and other tools.

STRONGER PACKERS • BETTER PACKERS THROUGH

Engineered **PACKER SERVICE**

20 years of Progress through Service

LANE-WELLS

Tomorrow's Tools-Today!

AP-504

When planning a pipe-line project—

THINK ABOUT PROTECTION!

Bitumastic Enamel being machine-applied

● When planning a new pipe line, it's wise to include Bitumastic Enamel in your original plans. These coal-tar enamels have established remarkable records for preventing corrosion . . . they have *proved* what they can do. Many oil and gas pipe lines—laid in the nineteen twenties — are still giving good service today, thanks to these durable enamels.

There are many reasons why Bitumastic Enamels are the best barrier against corrosion. Here's an important one: through the years, Bitumastic Enamels keep moisture away from pipe-line surfaces, and that prevents corrosion. *Ordinary* protective coatings just can't keep out moisture year after year.

Specify Bitumastic Enamels for *your* next pipe-line project. It's the sure way to guard against corrosion. For complete details and estimates, get in touch with one of our representatives.

Bitumastic Enamels soon available from Koppers new California Plant!

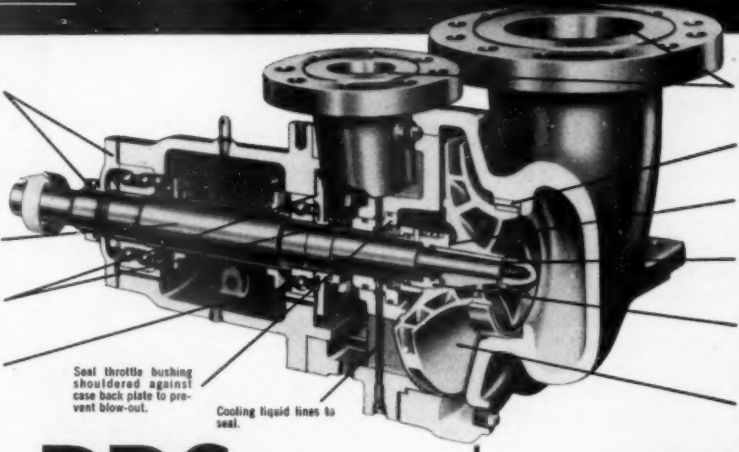
As soon as present construction work is completed, Koppers will be able to supply Bitumastic Enamels from a new plant at Fontana, California. The plant is being built to give you better service in the West.

KOPPERS BITUMASTIC ENAMELS
REG. U.S. PAT. OFF.

KOPPERS COMPANY, INC., Tar Products Division, Dept. 603T, Pittsburgh 19, Pa.
DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

First FROM PEERLESS

A HEAVY DUTY REFINERY & CHEMICAL PROCESS PUMP DESIGNED *WITH AND FOR* A MECHANICAL SHAFT SEAL


Slinger and special recessed bearing cap provide an effective seal without wearing parts.
Heavy duty thrust and radial bearings oil-lubricated.
Precision alloy steel, heat-treated, shaft.
Slinger and special recessed bearing cap provide an effective seal without wearing parts.
Extra large capacity oil reservoir.
Seal throttle bushing shouldered against case back plate to prevent blow-out.
Cooling liquid lines to seal.
Top suction and top discharge design. End-suction design available.
Case and impeller wearing rings are spot electric welded.
Mechanical shaft seal assembly.
Lock washer secures hex nut on shaft.
Seal sleeve keyed to shaft, gasketed at shaft shoulder to prevent leakage under sleeve.
Enclosed type impeller is keyed to shaft; repelling vanes on back shroud.

PEERLESS *type* PRS PROCESS PUMP

The Peerless Type PRS pump is designed *specifically* for mechanical shaft seal construction. All the advantages of proved mechanical seals are inherent in the Type PRS pump design.

1. LONGER LIFE. Mechanical seal design permits use of short shaft. A shorter shaft means greater rigidity, less deflection, minimum run-out, less wear in bearings, wear rings, seal and moving parts.

2. GREATER SAFETY. Throttle bushing is shouldered against case back plate from suction side; cannot blow out even under maximum operating pressure.

3. MORE ECONOMICAL. No premium is charged in first cost for the mechanical shaft seal construction of the Type PRS pump. Lower maintenance costs will be effected throughout its longer life.

4. AVAILABLE IN SEVERAL SIZES. Peerless Type PRS pumps are available for quick assembly and shipment from Peerless' Los Angeles stock in several sizes.

5. ENGINEERING CONSULTATION SERVICE. Help on selection and application of the Type PRS pumps to your problems is available from the Peerless factory or the Peerless field engineer or distributor nearest you.

PEERLESS PUMPS

Characteristics AT A GLANCE

Capacities	up to 1000 gpm
Operating Heads	up to 625 feet
Case Pressures	up to 400 psig
Temperatures	up to 250° F
Drives	horizontal electric motor is standard; other types available as required.

APPLICATIONS

Use the Peerless Type PRS pump for handling all petroleum hydrocarbons, process liquids, water, hot oil, LP-gases. Liquid end can be furnished in material suitable to the intended service.

PEERLESS BUILDS *Dependable* PUMPS

Write or wire today for further engineering information.

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
Address inquiries to Factories at:
Los Angeles 31, California and Indianapolis 8, Indiana
Offices: New York, Chicago, St. Louis, Atlanta; Dallas, Plainview and Lubbock, Texas; Fresno, Los Angeles; Phoenix, Albuquerque, N. M.; Tulsa

Puts The SEE In Cementing

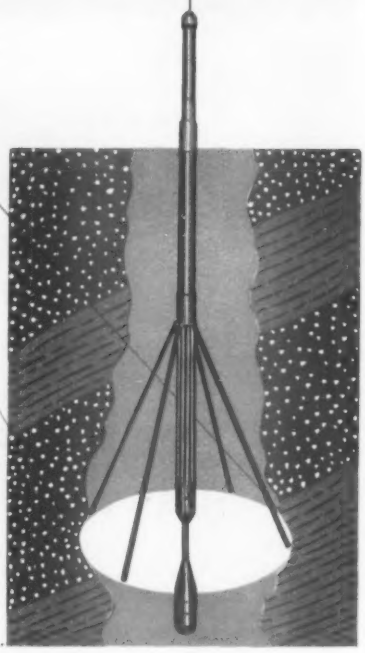
HALLIBURTON'S ELECTRIC CALIPER

There is no better way to *know* your well and avoid costly guesswork than by logging the variations in diameter of the open hole. Since each formation reacts differently to the drilling bit and to the hydraulicking of the drilling fluid, open hole calipering is the only positive way to *see* your well's diameter profile.

And there is no better, no more accurate way to secure this necessary information than Halliburton's Electric Caliper – the Caliper used today throughout the world to blueprint all types of operations and assure a much higher degree of success at the start without costly experimental error.

The exclusive Halliburton Electric Caliper has four spring-driven arms, independent of each other, which are released to open position at the start of the run. As the Caliper is pulled up, these arms ride over the changing profile of the hole, transmitting all variations by electrical circuit through the well logging cable to a recording mechanism at the surface. The recording is made directly in inches at a logging speed of approximately 100 feet per minute.

Certainly no tool has ever been developed which returns so much for such a small initial investment. Look into it before proceeding with any drilling or completion operation. Your nearby Halliburton representative has valuable data for your files regarding the many new uses for caliper logs. Or write for Technical Bulletins. Halliburton Oil Well Cementing Co., Duncan, Okla.



TYPICAL APPLICATIONS OF CALIPER LOGS

CEMENTING	Location of tight sections which should be reamed before setting pipe. Location of points where guides or stabilizers should be placed. Computation of quantity of cement. Interpretation of temperature logs.
PLUG-BACK JOBS	Computation of quantity of cement or plastics.
GRAVEL PACKING	Location of ledges to be underreamed. Computation of quantity of gravel.
PACKER SETTING	Location of seat. Determination of packer size.
CASING	Location of bottom of casing. Location of depth and length of lost casing. Determination of point where casing should be cut for salvaging.
WELL SHOOTING	Data on location and size of hole enlargements.
SIDE-WALL CORING	Determination of size of core barrel.
CASING PERFORATING	Explanation of failure to produce fluids, or to squeeze cement.
FISHING JOB	Determination of shape and size of fishing tool.
DRILLING MUD	Computation of volume of mud. Research on muds.
ACIDIZING	Computation of volume of acid to be used. Investigation of effect of acid.
LOGGING	Correlations. Identification of certain formations. Location of oil or gas reservoirs.
SALT-WATER INTRUSIONS	Location of points where formations have abnormally disintegrated.
TUBING INSPECTION	Location of points of wear or corrosion.

HALLIBURTON

YEARS AHEAD IN WELL LOGGING TECHNIQUES!

FASTER FIELD WELDING MEANS FASTER, EASIER PIPE LAYING

WITH CF&I WELDED STEEL PIPE

Men who work in the field with CF&I Welded Steél Pipe will tell you it can't be beat for faster and easier field welding.

That's because every length of CF&I pipe is made of special highly weldable steel... hydraulically tested and expanded for uniform size and roundness... precision bevelled at the ends for easy and accurate fit.

CF&I Welded Steel Pipe is offered in lengths of 40 feet and in overall diameters from 24 inches through 36 inches. Write for complete information to Claymont Steel Corporation, Claymont, Delaware.

Flanged and Dished Heads... Carbon, Alloy and Stainless-Clad Steel Plates

CF&I

WELDED STEEL PIPE

PRODUCT OF

CLAYMONT STEEL CORPORATION

SUBSIDIARY OF THE COLORADO FUEL AND IRON CORPORATION

REFINERY construction versatile

Leveling For new 740-acre Venezuelan oil refinery, Tournadozer leveled and rough-graded land for building site.

Near Puerta LaCruz, in the State of Anzoategui, Venezuela, Mene Grande Oil Company has installed an ultra-modern oil refinery in an area where only a short time ago there was nothing but unproductive wastelands. Adequate dock facilities were also constructed as well as housing units, recreational, educational, and medical centers for the laborers and technical staff.

TOURNADOZER handles 6 jobs

One of the busiest units on the 740-acre project was a highly mobile, rubber-tired C Tournadozer. Here are 6 of the jobs it handled prior to its current maintenance work:

① Push-loaded scrapers:

To speed initial land clearing, leveling, and grading for building sites, the powerful 186 h.p. Tournadozer push-loaded a fleet of high-speed, rubber-tired C Tournapulls.

② Pulled a Rooter:

When hard, rocky soils were encountered, the "C" pulled a LeTourneau Rooter to facilitate loading.

③ Towed a flat-bed:

Because of its ability to travel over paved surfaces without planking, as well as over rough terrain, Tournadozer was an ideal high-speed prime mover for a flat-bed trailer used to carry heavy equipment and supplies around the project.

④ Cleared right-of-way:

As a bulldozer, Tournadozer cleared refuse from the right-of-way for underground sewer lines.

Mail Today

To: R. G. LeTOURNEAU, Inc., Peoria, Ill. Please send me additional information on the 186 h.p. C Tournadozer.

☐ Specifications ☐ Price ☐ Delivery ☐ Where to see

NAME _____ TITLE _____

COMPANY _____ TYPE OF BUSINESS _____

STREET _____ CITY, STATE _____

and maintenance *speeded by* "work-and-run" C Tournadozer

Clearing Tournadozer-equipped rotary cleared right-of-way for sewer crews. After pipe was laid, rig backfilled earth into trenches.

Stockpiling Tournadozer kept busy between other jobs by stockpiling gravel and sand for the project's concrete plant.

(5) Backfilled trenches:

After drainage pipes were installed, the "C" dozed mixed dirt and rock back into the open trenches.

(6) Stockpiled sand and gravel:

At the project's cement plant, Tournadozer handled clean-up and piling assignments whenever needed.

Because it could drive anywhere at speeds up to 19 m.p.h., the Tournadozer frequently worked *all 6 jobs* in one day. On the 740-acre project, this mobility paid off in more work done per shift as well as a lower net cost per job.

For complete details on how rubber-tired Tournadozer can speed your work . . . cut cost per job . . . simplify spare parts inventory . . . and reduce maintenance costs, see your LeTourneau Distributor.

Side-boom Crane Attachment Increases Tournadozer's value

When you equip Tournadozer with side-boom crane, you get valuable added utility . . . a high-speed "trouble shooter" for your pipeline work. Tournadozer travels over highway or rough terrain under its own power at speeds up to 19 m.p.h. Here are some of this attachment's advantages:

Lifts 14 tons up to 12′ . . . 5 tons at maximum 12′ reach position. Boom and hoist lines are operated independently by twin, 2-speed, automatic-braking Tournatorque motors.

Instant-shift transmission completely eliminates shifting delays, jerky starts and stops when carrying load. Big 21.00 x 25 low-pressure tires cushion jars of traveling with a load.

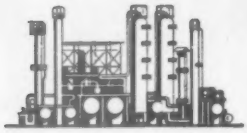
Lowers load smoothly under power while rig is stopped or in motion. All craning operations are fingertip electric controlled. Rig can carry load over pavement or through sand.

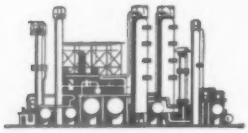
Tournapull – Rooter – Tournadozer – Tournatorque – Trademark Reg. U. S. Pat. Off. EX75-9L

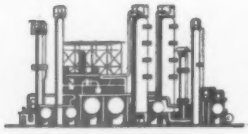
R. G. LeTOURNEAU, Inc.

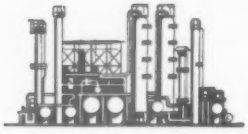
PEORIA, ILLINOIS

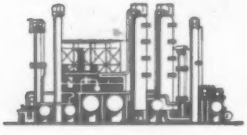
LeTOURNEAU LET EQUIPMENT

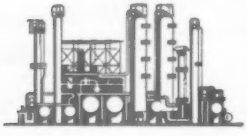


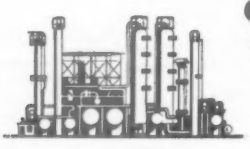












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refiners who have used
McKee Engineering Services
come back for more.

More than three-fourths
of our business
comes from companies
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More POWER FOR OIL DRILLING AND PUMPING

Built to stand Shock!!!

REPUBLIC TRANSMISSION BELTING

Here's a belt built away above your most rigid specifications . . . a rugged, flexible Republic Super Excelo Oil Country Transmission Belt that's designed to transfer power without slippage . . . a belt that'll handle overloads or sudden shocks without breaking.

Republic Rubber offers you premium Industrial Rubber Products like this at standard prices because for 52 years we've specialized in super-tough oil country equipment.

Republic knows from experience what field men need. Republic builds to specifications more rigid than any other existing set of standards. Get in touch with your local Republic Distributor or write direct immediately for full information regarding this super-tough Transmission Belting and every other kind of hose and belt used on your job.

Remember, if it's made of rubber, Republic builds it—BETTER!!!

INDUSTRIAL RUBBER PRODUCTS BY
REPUBLIC RUBBER DIVISION
Lee Rubber & Tire Corporation
YOUNGSTOWN, OHIO

Five two-stage gas boosters, each handling 1,770,000 SCFD from 10—to 120—psig, at 800 rpm, direct connected to V-12 Climax gas engines.

FULLER ROTARY COMPRESSORS

Single-stage gas booster handling 3,560,000 SCFD from 15—to 45—psig, driven by V-12 Climax gas engine through gear speed reducer.

Single-stage gas booster handling 2,400,000 SCFD from 150—to 250—lb. psig, at 870 rpm, direct connected to Waukesha gas engine.

Oilmen in Texas invest in the FULLER ROTARY COMPRESSOR

Fuller compressors are available in a range of cylinders up to 3300 c.f.m. (at atmospheric intake) at normal speeds, with a reasonable variation in speed range—motor, engine, or turbine drive.

For extra gas boosting to plant or trunk level, Fuller Rotary Compressors can be spotted along gathering or supply lines where they operate efficiently, under the most adverse conditions, without constant supervision.

Fuller Compressors require little maintenance because only the rotor, blades and bearings move. No valves to leak or seats to grind. Blades automatically compensate for wear . . . maintained capacity for the life of the machine. Pulsations and vibrations are reduced to a minimum. For the most efficient, economical way to boost pressures, install the Fuller Rotary Compressor. Write for Bulletin C-6, now.

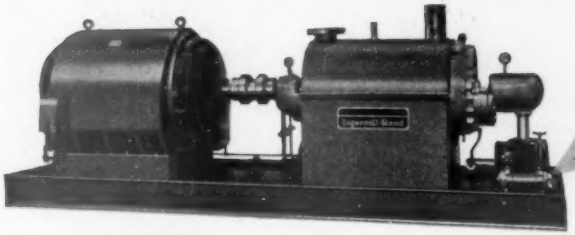
Fuller

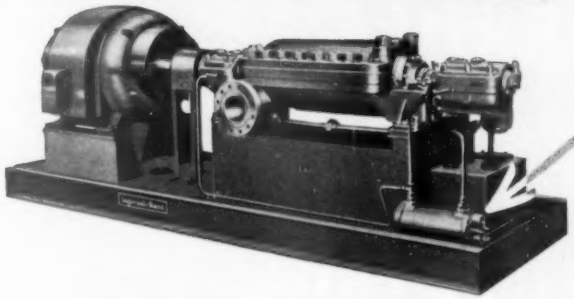
FULLER COMPANY, Catasauqua, Pa.
Chicago 3—120 So. LaSalle St.
San Francisco 4—420 Chancery Bldg.

PIONEERS OF HIGH-EFFICIENCY VANE-TYPE ROTARY COMPRESSORS

C-226

properly cooled lubricating oil a certainty in these Ingersoll-Rand Centrifugal Pumps





they're Ross Exchanger equipped

● Operating efficiencies of I-R multi-stage centrifugal pumps *stay higher longer,* with less and easier maintenance required.

Materials that are carefully selected for dependability, plus simple, more rugged construction, are given as the principle reasons for this claim by Ingersoll-Rand . . . *the very reasons that Ross Exchangers are used so extensively!*

For, on those pumps that do require oil cooling, the exchanger has a very important function. It is a vital part of a complete force feed system that supplies lubricating oil *at the proper temperature* to the thrust and radial pump bearings, and in some instances, the driver bearings, depending on the installation. Without an efficient exchanger, the oil might reach such high temperatures that it would break down, losing its necessary lubricating qualities, and thereby risk seizure and damage of close-clearance parts.

Therefore, in high pressure refining service, boiler feed service in central stations and industrial plants, and allied applications, it's easy to understand why Ingersoll-Rand provides the built-in protection of Ross Type BCF Exchangers on most of its multi-stage centrifugal pumps.

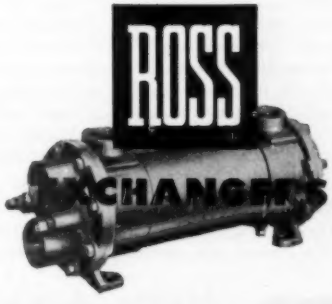
Compact, all-copper and copper alloy construction; pre-engineering, full standardization, mass production are Ross Type BCF features that hold great benefits for Ingersoll-Rand and other manufacturers of pumps, Diesels, compressors, turbines and numerous types of primary equipment. Information in new Bulletin 1.1K5, describes these benefits specifically. Write.

ROSS HEATER & MFG. CO., INC.

Division of American Radiator & Standard Sanitary Corporation

1417 West Avenue Buffalo 13, N. Y.

In Canada, Horton Steel Works, Limited, Fort Erie, Ont.



Serving home and industry

AMERICAN-STANDARD · AMERICAN BLOWER · ACME CABINETS · CHURCH SEATS · DETROIT LUBRICATOR · KEWANEE BOILERS · ROSS HEATER · TONAWANDA IRON

Here is a magneto that controls explosive fumes with "flame-proof" ventilation. The special ventilating arrangement of the Bendix Low-Tension Magneto permits air laden with explosive fumes to enter the magneto for ventilation without danger of igniting the surrounding air. Kits are also available to convert magnetos now in use to the "flame-proof" ventilation type.

In addition to this important safety feature Bendix Low-Tension Magnetos actually reduce engine maintenance and operating costs. For example, spark plug erosion is reduced to a minimum. The distribution of low tension voltage to the high tension coils is through a series of breaker assemblies, thus eliminating trouble often experienced with the conventional distributor. Variable or fixed sparks can be obtained by internal adjustment.

For safety and low operating costs it will pay you to specify Bendix Low-Tension for all your magneto requirements. Complete data available on request.

- **Low Plug Erosion Rate**
- **Breaker Type Distributor**
- **Ventilation without Fire Hazard**
- **Radio Shielding Available**
- **Variable or Fixed Ignition**

Bendix

SCINTILLA MAGNETO DIVISION OF
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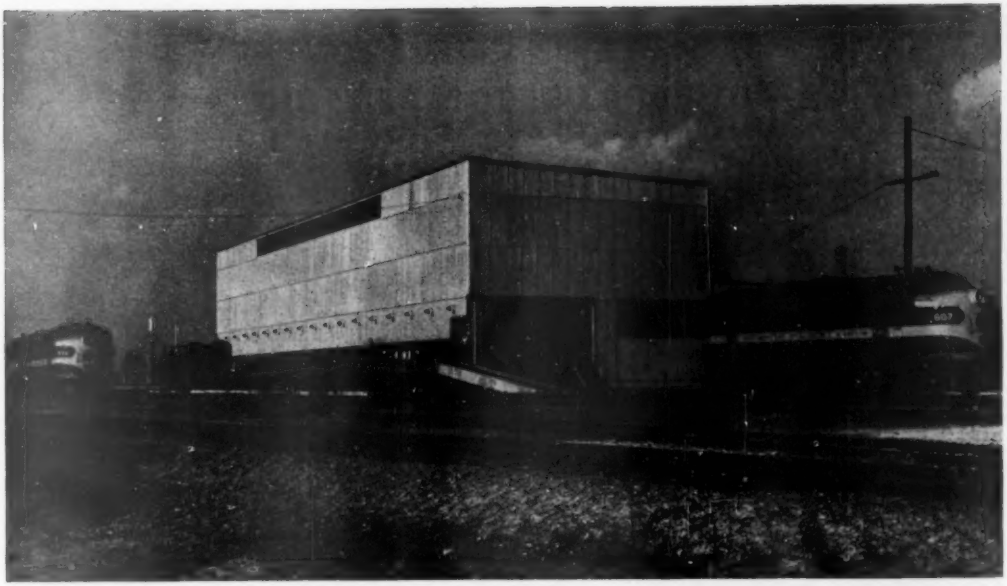


There's no maintenance problem where you use "CENTURY" corrugated asbestos-cement sheets

Diesel Repair Shop, Signal and Control Tower at the Settegast Freight Yard of the Missouri Pacific Lines at Houston, Texas. Buildings sided with long-lasting "Century" Corrugated Asbestos-Cement Sheets. Engineers and Builders: The Austin Company

As you know, among railroading's headaches are its many maintenance jobs. Here a big one was lopped from the list, right at the start—by the use of "Century" Corrugated Asbestos-Cement Sheets . . . because roofs and siding of "Century" Asbestos Corrugated reduce upkeep to a minimum.

Buildings so constructed provide permanent protection for men, equipment, materials and finished products. "Century" Asbestos Corrugated *can not burn, rot or rust;* rodents and termites can't hurt it; it resists many chemical fumes. And regardless of climate, driving winds and deluging rains, it never needs protective painting to preserve it!

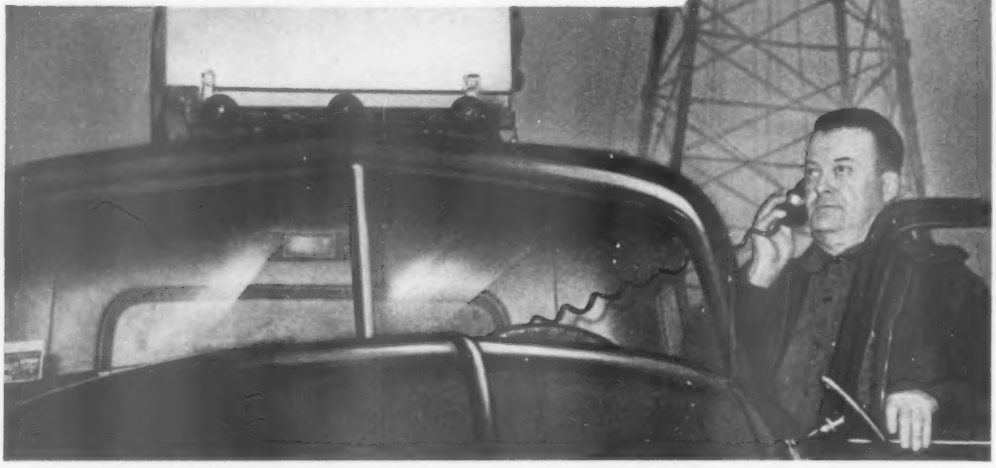
This unique material can be applied quickly, easily and inexpensively. The sheets are very strong, yet can be cut and drilled with ordinary working tools, and fastened in place with a minimum of labor.

If you are planning to construct from the ground up, or need merely to "re-cover" an old building, give earnest consideration to the outstanding money-saving qualities of "Century" Corrugated Asbestos-Cement Sheets for both roofing and siding. We'll be glad to send you complete details on request.

Nature made Asbestos . . .
Keasbey & Mattison has made it serve mankind since 1873

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

G-E RADIO CONTROL SPEEDS REPAIRS ON NATURAL GAS PIPELINE



GAS LEAKS in a 240-mile pipeline can be expensive, especially if the line runs through mountainous country. But by spotting the leaks quickly, then summoning repair crews by radio, pipeline operators can save miles of deadhead driving and hundreds of manhours.

In western Pennsylvania, the Trans-Penn Transit System produces and pipes natural gas to its distributing customers. To prevent long shutdowns due to breaks in the line, the company employs G-E 2-way radio units in trucks and supervisory vehicles, as well as at drilling rigs and compressor stations. This high-speed communication system helps three repair crews do the work of four with less effort, less waste motion.

General Electric's CAS* man at the G-E office near you can demonstrate how to cut communication costs in *your* business. Call him today. There's no obligation. *General Electric Company, Electronics Park, Syracuse, N. Y.*

*Communications Advisory Service

Isolated compressor station is "on the air" at any time with radio. Operator sends pressure reports at specific intervals, receives orders from headquarters 60 miles away, instantly.

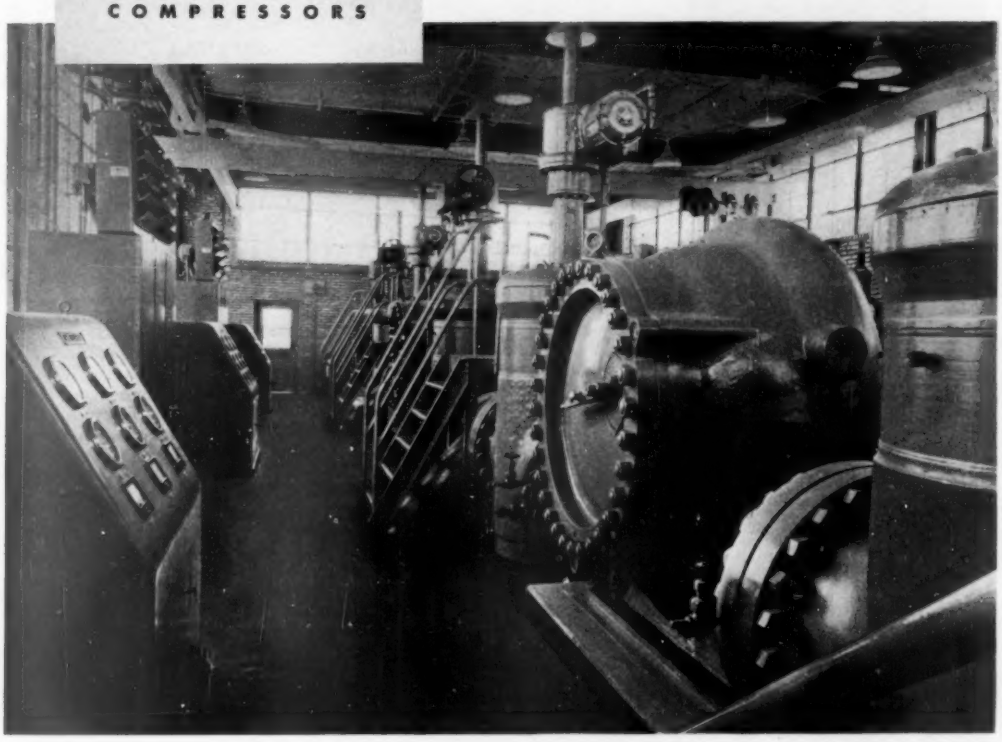
Radio-equipped trucks, carrying supplies or repair crew, can be dispatched rapidly to any spot on the line. Quick transfers of men or equipment cut maintenance costs.

In action less than a year, G-E radio system is already worth many times its cost to this pipeline management. Winter or summer, the radio units are unaffected by weather.

GENERAL ELECTRIC

DE LAVAL
CENTRIFUGAL
COMPRESSORS

on the job at Texas Eastern



The centrifugal compressors on Texas Eastern Transmission Corporation's new 30-inch gas pipeline from Kosciusko, Mississippi, to Uniontown, Pennsylvania, are all De Laval.

Thirteen De Laval compressors will be installed in stations at Barton, Alabama; Gladeville, Tennessee (shown above); and at Wheelersburg and Berne, Ohio. Each station will be equipped with three 2,500 horsepower motor-driven compressors, except Berne, which will have four.

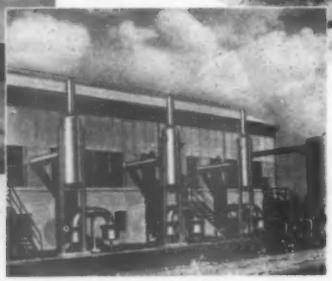
One of the outstanding engineering features of these compressors is the effective use of inlet guide vanes. This De Laval feature provides greater operating flexibility than has been previously possible with constant speed motor-driven units.

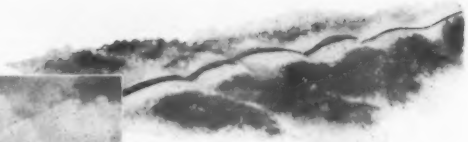
Once again De Laval engineering has led the way in developing better centrifugal compressors for natural gas transmission. If you want to know more about the advantages of De Laval centrifugal compressors—consult our engineers. They will be glad to give you the benefit of our wide experience on the major gas pipelines using centrifugals.

DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY
Trenton 2, New Jersey

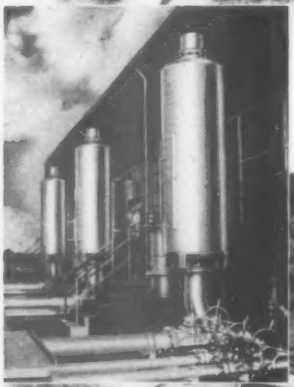
DLC-181

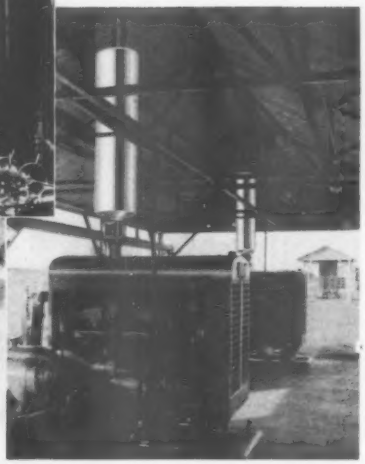




At stations along the pipelines ...You find

BURGESS-MANNING SNUBBERS





● REDUCING ENGINE EXHAUST AND COMPRESSOR INTAKE NOISES

Burgess-Manning Snubbers quiet the explosive exhaust from noisy internal combustion engines. These Snubbers convert the high-energy slugs of exhaust gases to a continuous flow . . . dissipating their energy to reduce the roar to the required noise-level. Snubbers, likewise, effectively reduce the throbbing pulsations of compressor intakes.

● REDUCING SURGING IN GAS AND AIR PIPING

Burgess-Manning Gas and Air Line Snubbers prevent the rapid pressure change, which occurs at the compressor or pump, from being transmitted to the pipeline. The reduction in surging practically eliminates vibration. Gas and Air Line Snubbers smooth the flow of gas without excessive restriction and stop vibration without mechanical damping. Metering fluid flow is, likewise, greatly simplified. Consult Burgess-Manning, today.

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No. 716
R-P&C Rising Stem
Bronze Gate Valve

Easy to Clean... Long-Lasting

• Designed for quick disassembly where frequent cleaning is necessary. Union bonnet adds strength; won't distort body or threads when removed. Rising stem shows position of wedge; fluid not in direct contact with operating threads.

High test bronze body and bonnet; high tensile rolled bronze stem; nickel-alloy solid wedge and seat rings. Sizes ¼" to 3". Steam: 200 lbs. at 500° F; OWG: 400 lbs. non-shock.

The No. **716** R-P&C Bronze Gate Valve is economical to buy and use. See your R-P&C distributor or write nearest R-P&C district office for full information.

R-P&C valves

ACCO

TRADE MARK

R-P&C VALVE DIVISION
AMERICAN CHAIN & CABLE

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Every step in pipeline operations is based on experience. Out of experience come newer, faster, better ways of doing things.

The communications services offered by the Bell Telephone System are based on more than 75 years of experience. Our whole business is communications and our stock in trade is service. We have the experience-tested equipment and the skilled manpower to deliver just as much communications as you need — and can adjust to more or less service, as your needs change.

You can measure our experience in delivering communication services in miles, in years, or in numbers of customers and you'll find it unequalled. Our nationwide network of microwave radio, wire and cable stands ready to meet your needs.

Your Bell Telephone Company will be glad to study your communications problems and needs without charge.

PRIVATE-LINE TELEPHONE

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METERING CHANNELS

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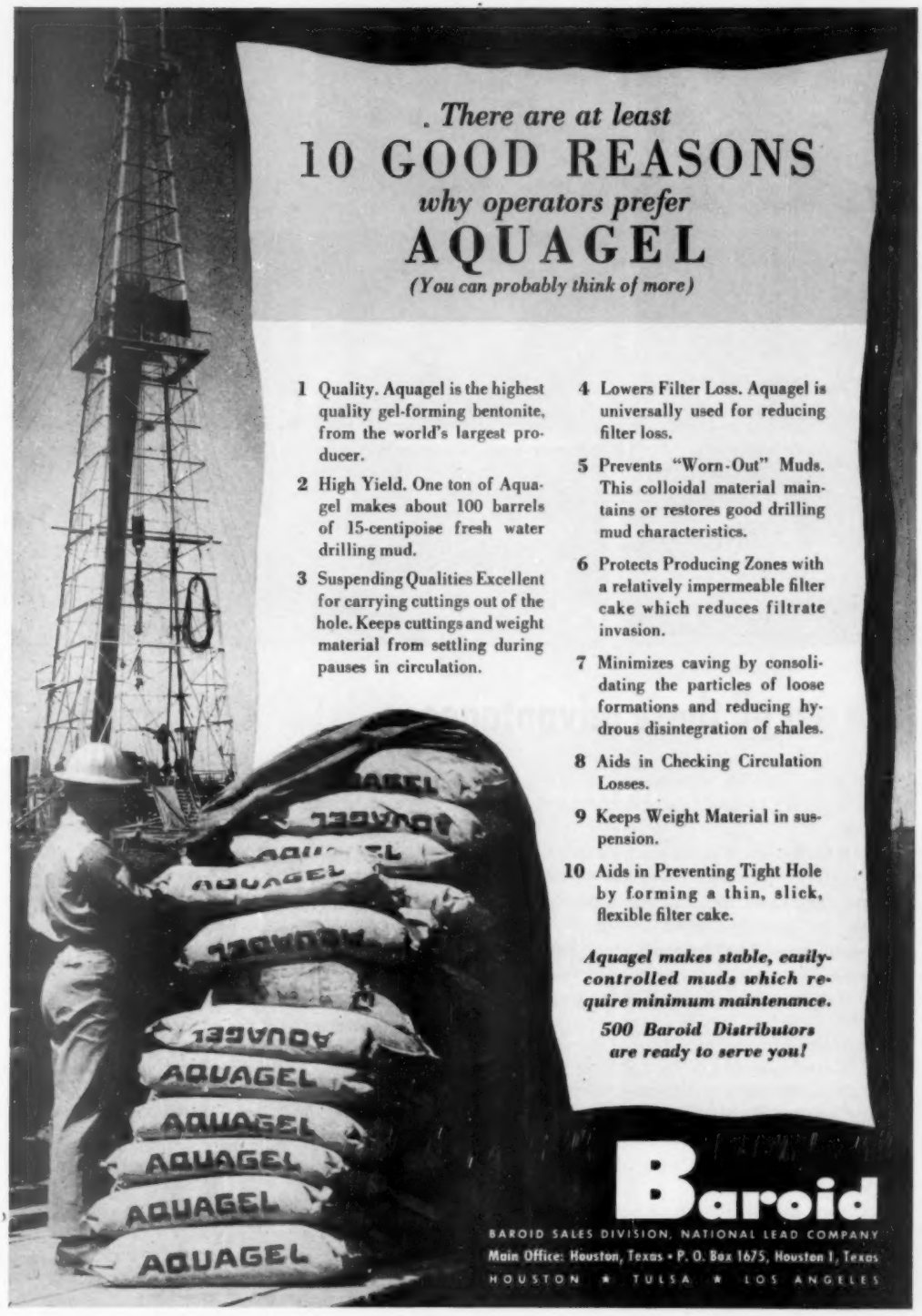
. There are at least
10 GOOD REASONS
why operators prefer
AQUAGEL
(You can probably think of more)
1 Quality. Aquagel is the highest quality gel-forming bentonite, from the world's largest producer.
2 High Yield. One ton of Aquagel makes about 100 barrels of 15-centipoise fresh water drilling mud.
3 Suspending Qualities Excellent for carrying cuttings out of the hole. Keeps cuttings and weight material from settling during pauses in circulation.
4 Lowers Filter Loss. Aquagel is universally used for reducing filter loss.
5 Prevents "Worn-Out" Muds. This colloidal material maintains or restores good drilling mud characteristics.
6 Protects Producing Zones with a relatively impermeable filter cake which reduces filtrate invasion.
7 Minimizes caving by consolidating the particles of loose formations and reducing hydrous disintegration of shales.
8 Aids in Checking Circulation Losses.
9 Keeps Weight Material in suspension.
10 Aids in Preventing Tight Hole by forming a thin, slick, flexible filter cake.
Aquagel makes stable, easily-controlled muds which require minimum maintenance.
500 Baroid Distributors are ready to serve you!
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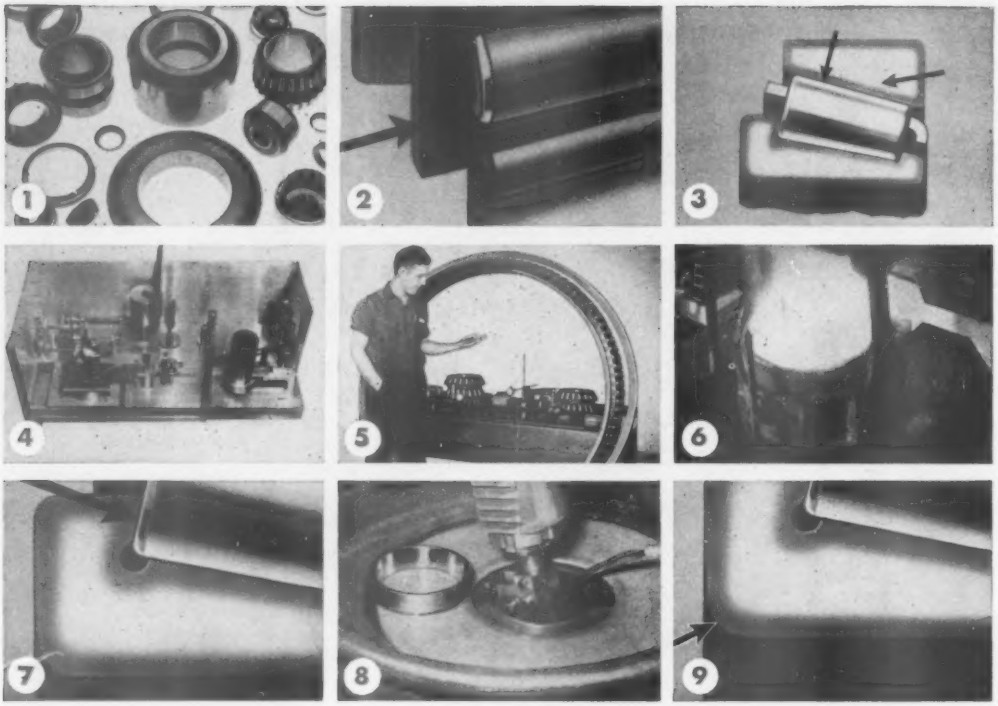


You get all these advantages with TIMKEN® bearings!

Shown above are some of the important reasons why it pays to specify Timken® when you buy tapered roller bearings.

1. 26 TYPES. Because Timken bearings are made in 26 different types, you get exactly the right one for your job.

2. SOFT STEEL CAGE separates the rollers in Timken bearings and prevents scuffing.

3. TOUGH INSIDE—HARD OUTSIDE. Case carburizing of Timken bearing rollers and races gives them a hard, wear-resistant surface, combined with a tough, shock-resistant core.

4. MICRO-INCH FINISH. With help of the profilograph which measures surface irregularities to a millionth of an inch, the Timken Company has developed a bearing finish of micro-inch accuracy.

5. 5850 SIZES. If you need a bearing smaller than your finger or 7 1/2" in diameter, you can get it from the Timken Company.

6. WE MAKE OUR OWN STEEL. Because Timken bearings are made of special alloy steel, produced in the Timken Company's own mills, they have extra strength and wear resistance.

7. POSITIVE ROLLER ALIGNMENT is maintained by the rib of cone—skewing prevented, maximum bearing capacity assured.

8. CLOSER TOLERANCES in the manufacturing of Timken bearings make possible production bearings with a maximum runout of 75 millionths of an inch or less.

9. GENEROUS RADIUS on the inside diameter of Timken bearing cones permits greater shaft strength.

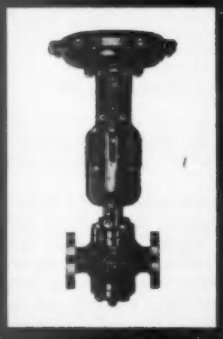
No other bearing can give you *all* the advantages you get with Timken bearings. Be sure the tapered roller bearings you buy carry the name "Timken", the trade-mark of The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO". Canadian plant: St. Thomas, Ontario.

TIMKEN TAPERED ROLLER BEARINGS

TRADE-MARK REG. U. S. PAT. OFF.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▱ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION →✳←

for safe, easy stem lubrication



The isolating valve in the stem lubricator of the Honeywell Series 700 Valve affords maximum safety against leakage when replenishing stem lubricant . . . tight-fitting conical plug and machined seat assure leakless shut-off . . . pinned bonnet prevents accidental removal. The Honeywell Series 700 wide band proportional valve comes in a full range of styles and sizes . . . has *all* the features you look for in a fine valve. Write today for your copy of Bulletin 700-2.

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VALVE PRODUCTS

First in Controls

DESCO can Lubricate and Adjust YOUR VALVES *cheaper and better* than you can!

Yes, we will give you odds that a Desco Valve Lubricating Crew with a Desco mobile unit can not only lubricate and adjust your lubricated valves better—*but save you money by letting Desco do it!*

Every Desco service truck is completely equipped with every possible tool and fitting to service valves in minutes where it usually requires hours. Desco high pressure grease equipment can deliver 180 pounds of lubricant per hour. Figure for yourself the man-hours we save—AND THIS SAVING IS PASSED ON TO YOU! What's more you are assured of your valves being serviced at the proper intervals and with the CORRECT LUBRICANT.

MAKE US PROVE IT!

If you are doing your own valve lubricating by usual methods, DESCO CAN SAVE YOU MONEY —we can prove it! Write and find out NOW!

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SHREVEPORT, LOUISIANA, U.S.A.

They Say—

Invitation to Wildcatters

"A legislative committee has voted unanimously to recommend that no new taxes be levied on Nebraska oil or natural gas at this time. We think it voted wisely.

"While Nebraska's oil and gas discoveries in the last 2 years have been highly encouraging, much remains to be done. Vast areas in the state have not been explored adequately, in some cases not at all. A severance tax on gas or oils would reduce the prospect of profit, which naturally would reduce wildcatting. Nebraska needs wildcatting, the more the better."

Editorial in the Omaha World Herald.

War Deterrent

"The great superiority of the free nations' oil industry over that of the Soviet powers is perhaps as great a deterrent as the atomic bomb in preventing World War II."

Dr. Marlin M. Volz, dean of the school of law, University of Kansas City, speaking in Carthage, Mo.

Synthetic-Rubber Need

"We should begin now to lay out a national program of synthetic-rubber expansion.

"It should be developed in such manner as to assure the presence of additional capacity in advance of the actual need. Existing plants should be made ready while there is still time for orderly thinking.

"This preventive approach to the problem of growing demand will spare us the ordeal of more drastic remedies later on."

P. W. Litchfield, board chairman, Goodyear Tire & Rubber Co., speaking in Akron.

Oil's Freight Bill

"I have no definite figures on what the whole petroleum industry spent last year for freight, but I do know that my own company, its affiliates and subsidiaries paid shipping companies over $17 million for cargo space, and I have been advised that a reasonable total for the industry would be around a quarter billion dollars. . . .

"Take the case of the Trans-Arabian Pipe Line, the 1,100-mile line carrying oil from the Persian Gulf to the Mediterranean. The logistics for this project challenged the imagination—not to say the shipping industry.

'It was necessary to move 265,000 tons of steel, alone, 10,000 miles, from the United States. The builders of the line estimate that total shipments of all items came to 3 billion ton-miles of ocean freight."

Richard G. Coffin, Socony-Vacuum Oil Co., Inc., addressing the Propeller Club of Genoa.

T.I.P.R.O. on Decontrol

"It is our conviction that decontrol should be removed from the discretion of OPS and made mandatory for any commodities not now in short supply.

"An extension of the controls act beyond June 30 without providing for mandatory decontrol of commodities for which there exists no justification for control would do serious injury to the expansion effort of industry."

Bryan W. Payne, president of Texas Independent Producers and Royalty Owners Association, speaking in Austin.

Pleased Engineer

Sir:

Congratulations on your issue of May 12, 1952. From the standpoint of a pipe-line engineer it is probably one of your finest.

Although I am concerned mostly with products lines, I found all the articles extremely interesting and informative.

Irwin S. Ottenberg,
Fort Bragg,
North Carolina.

Cost of Middle East Oil

"Wells are costly to drill mainly because the fields are located so far from sources of material and skilled manpower . . .

"The company must build complete communities on which to base operations. Skilled labor must be brought from overseas at high rates of pay and these employes and their families are transported to the field at company expense . . .

"Although the rates of pay for common labor are comparatively low, the productivity of these workers is correspondingly low. As a result, there is no such thing as low-cost labor in these foreign operations.

"Considering all these costs, plus the royalty payment to the government and the profit sharing which is the new

pattern for operations abroad, we find the cost per barrel of Middle East production is about the same as it is for prolific production in this country.

"Because Middle East oil is located so far from its source, the posted price for crude in the Persian Gulf is $1.75 per barrel as compared to about $2.65 per barrel for similar domestic crude delivered to the Gulf. This means the net return on Middle East crude is well under that from a prolific West Texas field."

R. G. Follis, board chairman, Standard Oil Co. of California, speaking in Los Angeles.

CALENDAR

JUNE

12-13 Western Petroleum Refiners Association, regional technical and industrial-relations meeting, Broadview Hotel, Wichita.

12-14 Liquefied Petroleum Gas Association, annual mountain states district convention, Cosmopolitan Hotel, Denver.

13-14 Rocky Mountain Oil and Gas Association, midyear meeting, Rainbow Hotel, Great Falls, Mont.

16-19 American Society of Mechanical Engineers, semiannual meeting, Sheraton-Gibson Hotel, Cincinnati, Ohio.

16-22 International Gas Conference, Brussels, Belgium.

19-20 Kentucky Oil and Gas Association, annual meeting, Hotel Lafayette and Phoenix Hotel, Lexington, Ky.

22-25 Petroleum Equipment Suppliers Association, Mark Hopkins Hotel, San Francisco.

23-24 Michigan Gas Association, annual meeting, Grand Hotel, Mackinac Island, Mich.

23-27 American Society for Testing Materials, annual meeting, Hotel Statler, New York.

23-27 American Institute of Electrical Engineers, summer general meeting, Nicollet Hotel, Minneapolis.

23-27 American Society of Mechanical Engineers, Oil and Gas Power division, annual conference and exhibit, Hotel Statler, Buffalo, N. Y.

JULY

21-25 National Conference on Clays and Clay Technology, University of California, Berkeley.

AUG.

1- 3 Wyoming Geological Association, field trip, Big Horn basin.

11-13 Society of Automotive Engineers, national West Coast meeting, Fairmont Hotel, San Francisco.

19-22 American Institute of Electrical Engineers, Pacific general meeting, Westward Ho Hotel, Phoenix, Ariz.

25-27 Twelfth Annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

SEPT.

3- 5 Pacific Coast Gas Association, Ambassador Hotel, Los Angeles.

4- 5 Rocky Mountain Oil & Gas Association, refining committee, Newhouse Hotel, Salt Lake City.

8-12 Instrument Society of America, seventh national instrument conference and exhibit, Cleveland.

10-12 National Petroleum Association, fiftieth annual meeting, Hotel Traymore, Atlantic City, N. J.

11-13 American Institute of Chemical Engineers, regional meeting, Palmer House, Chicago.

25-26 Western Petroleum Refiners Association, regional meeting, Hotel Henning, Casper, Wyo.

28-30 American Association of Oilwell Drilling Contractors, annual meeting, Skirvin Hotel, Oklahoma City.

OCT.

1- 3 American Institue of Mining and Metallurgical Engineers, Mid-Continent fall meeting, Rice Hotel, Houston.

1- 3 Interstate Oil Compact Commission, fall meeting, Banff, Canada.

1- 3 National Association of Corrosion Engineers, South Central Region, technical program and committee meetings, Jung Hotel, New Orleans.

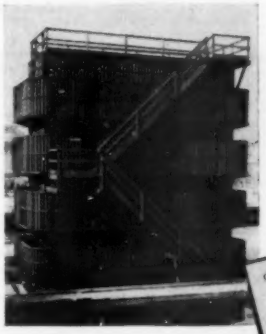
1- 3 American Institute of Mining and Metallurgical Engineers, Mid-Continent fall meeting, petroleum branch, Rice Hotel, Houston.

2- 3 Petroleum Electric Power Association, twenty-third annual meeting, Mayo Hotel, Tulsa.

6 Independent Natural Gas Association of America, annual meeting, Fontenelle Hotel, Omaha, Neb.

9-10 California Natural Gasoline Association, twenty-seventh annual fall meeting, Ambassador Hotel, Los Angeles.

cooling towers last twice as long with Fluor periodic inspections



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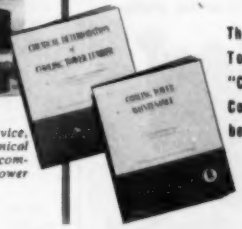
Let a Fluor qualified specialist inspect your cooling towers periodically, to keep them at peak performance. Small defects can be detected early to prevent expensive repair bills later. Operating life can actually be doubled!

At no cost to you, Fluor will inspect to determine repairs necessary to bring it back to original efficiency, will furnish a complete written report, a blueprint and itemized statement of materials needed and will bid for the job competitively.

Regardless of the make or model, Fluor will repair it economically—on a contract or cost-plus basis. We have the experience, the men, materials and facilities to handle the entire job or any part of it. Inquire through any Fluor office.



These two papers—"Cooling Tower Maintenance" and "Chemical Deterioration of Cooling Tower Lumber" will be mailed free on request.

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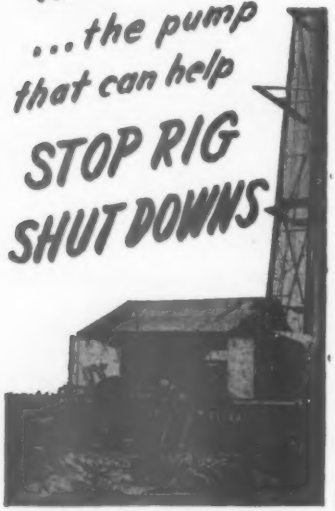
Marlow "MUD HOG" ...the pump that can help STOP RIG SHUT DOWNS

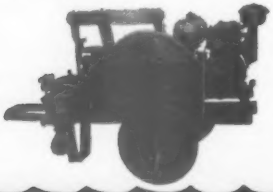


With this famous diaphragm pump on the job you don't need to shut down your rig to clean cuttings from pits, mix muds or pump water. What's more, your slush pump is free to stay on its profit-producing job — circulating drilling mud.

At your rig a Marlow "Mud Hog" can:

Eliminate jets to clean pits
Reduce costly drilling-mud loss to waste pit
Cut down water loss to waste pit
Mix mud and feed slush pump directly . . . eliminate unused mud at slush pump suction
Transfer water from waste pit
Supply water at low pressure

A Marlow "Mud Hog" is the unrivalled "tough baby" of the oil country. Write for complete details about this dependable money-saving pump.



MARLOW PUMPS
544 GREENWOOD AVENUE
RIDGEWOOD, NEW JERSEY
Engineers and Representatives Everywhere

13-15	Texas Mid-Continent Oil and Gas Association, thirty-third annual meeting, Hotel Texas, Fort Worth.
13-17	American Institute of Electrical Engineers, fall meeting, New Orleans.
16-19	Permian Basin Oil Show, Odessa, Tex.
19	Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.
20-21	Independent Petroleum Association of America, annual meeting, Mayo Hotel, Tulsa.
22-24	Society of Automotive Engineers, national transportation meeting, Hotel William Penn, Pittsburgh, Pa.
22-24	American Institute of Mining and Metallurgical Engineers, West Coast fall meeting, petroleum branch, Statler Hotel, Los Angeles.
23-24	American Institute of Mining and Metallurgical Engineers, West Coast fall meeting, Statler Hotel, Los Angeles.
24-25	Independent Petroleum Association of America, annual membership meeting, Skirvin Hotel, Oklahoma City.
27-31	American Gas Association, annual convention, Atlantic City, N. J.
30-Nov. 1	Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.

NOV.

3- 4	Society of Automotive Engineers, national diesel engine meeting, Chase Hotel, (tentative), St. Louis, Mo.
6- 7	Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.
6- 8	Gulf Coast Association of Geological Societies, annual fall meeting, Hotel Driscoll, Corpus Christi, Tex.
8-13	Oil Industry Information Committee, Conrad Hilton Hotel, Chicago.
10-13	American Petroleum Institute, thirty-second annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.
13-14	Society of Exploration Geophysicists, midwestern meeting, Texas Hotel, Fort Worth.
20-22	Instrument Maintenance Short Course, jointly sponsored by Southern California Meter Association and Los Angeles Harbor Junior College.
30-Dec. 5	American Society of Mechanical Engineers, Statler Hotel, New York City.

DEC.

5- 6	Interstate Oil Compact Commission, winter meeting, Wichita, Kans.
7	Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex.
7-10	American Institute of Chemical Engineers, annual meeting, Hotel Cleveland (Hqs.) and Carter Hotel, Cleveland.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Olde College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

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Ask him—he'll tell you Klein tools and equipment just can't be beat for service—for safety. Look for the familiar Klein trade-mark on pliers and climbers, safety straps and belts, lag wrenches and grips. It has been a trade-mark of quality . . . "Since 1857."

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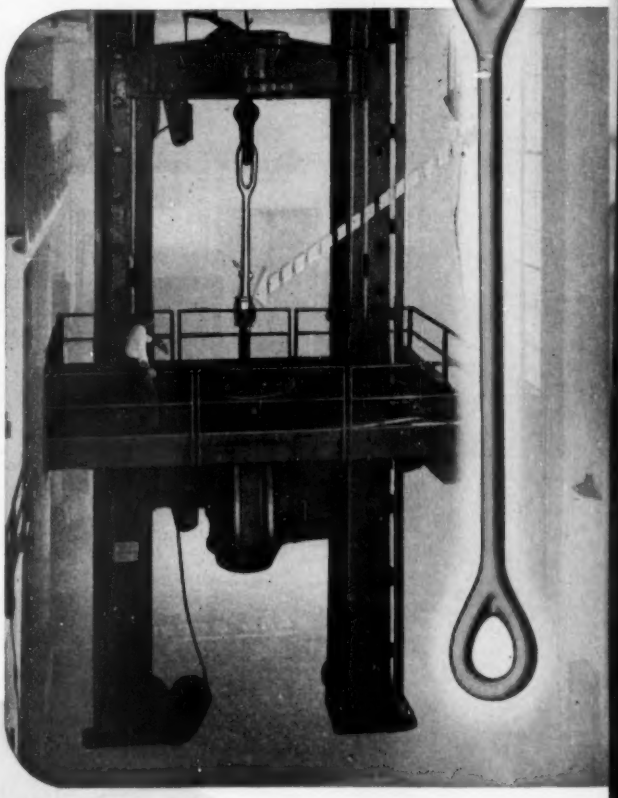
Here's why we know these links are BEST



Only a test to destruction justifies the recommended load capacity and assignment of the 4 to 1 safety factor for Web Wilson FORGED Elevator Links. Links of each shank diameter, taken at random from stock, are *tested to destruction* on the Baldwin-Southwark Testing Machine (at right) which is capable of exerting a force of 4,000,000 pounds.

Here is scientific proof that these links are BEST, but let us consider the factors which result in such superiority . . .

Starting with engineering calculations which insure adequate steel at points of stress—made from steel better suited to the requirements, and higher in cost than is used in other makes of links—Web Wilson FORGED Elevator Links are the *only drop forged* links available today; welding is entirely eliminated.

Next follows heat treating to exacting standards in modern *vertical* furnaces to avoid warping or distortion—then each link is carefully "Magnafluxed" to assure uniform quality and freedom from *any* imperfections.

That's why we *know* that Web Wilson FORGED Elevator Links are BEST—that's why we can proudly say "They are the strongest 'link' in your drilling string."

WEB WILSON *forged* ELEVATOR LINKS

Shank Diameter INCHES	*Rated Capacity TONS PER LINK*	
1¾	65	*Lengths from*
2¼	110	*36 inches to*
2¾	150	*108 inches*

Tops in the field, WEB WILSON *Forged* ELEVATOR LINKS *today* provide *extra strength, extra safety and extra value* for heavy duty service and severe usage.

IF YOU WANT TO "GET TECHNICAL"

Web Wilson FORGED Elevator Links are made from SAE 4140H steel which is considerably harder and more expensive to forge and heat treat than the steel used in other makes of links. You will find it worth while to refer to the chemical analysis of SAE 4140H steel, which is as follows: Carbon, .35 to .45; Manganese, .70 to 1.05; Chromium, .80 to 1.10; and Molybdenum, .15 to .25. Hardenability of SAE 4140H steel runs from 39 to 55. With a Brinell hardness of 350, the tensile strength is approximately 200,000 psi for SAE 4140H steel. Higher tensile strength; greater resistance to shock; higher toughness resulting in better resistance to wear—all vital factors in an elevator link—amply justify your approval and specification of Web Wilson Links over competitive makes.

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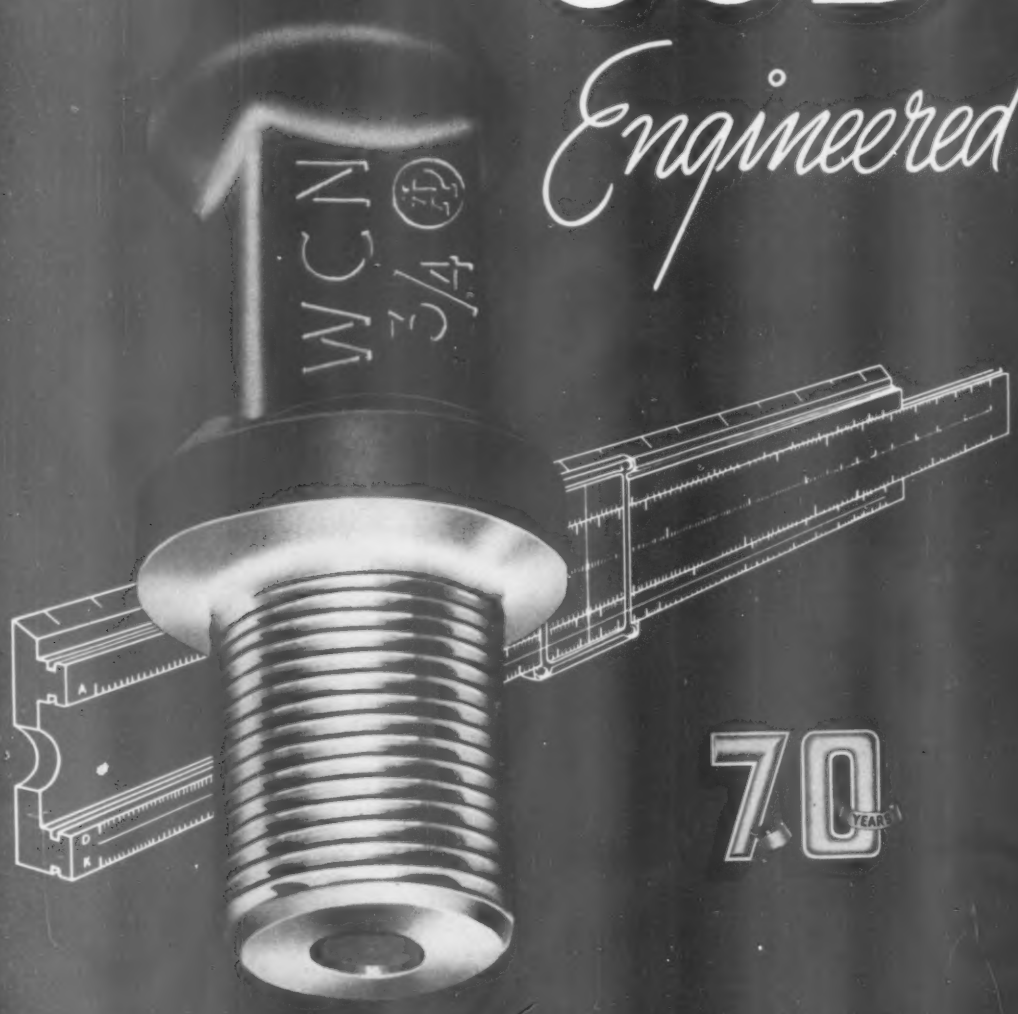

7.0 YEARS

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Subscription rate to the petroleum industry, United States and foreign, 1 year, $4.00. Single copies, 50 cents. Back copies when over a year old, one dollar. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1952 by The Petroleum Publishing Co.

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JOURNALLY Speaking

Our Lingo

WE read a dictionary the other day—that's right, read a dictionary—and found it fascinating. This new book, "The Petroleum Dictionary," had lain on our desk unopened for some time because we had no occasion to look up anything. Then one day we picked it up and glanced idly at the preface—and didn't lay it down until we got clear to yo-yo stick and zero oil on the last page.

There have been glossaries of petroleum terms before, but this one includes all technical terms, slang terms, common words, uncommon words, accepted abbreviations, peculiar abbreviations, and oil men's lingo from all sections of the industry. Moreover, it was compiled by a professional lexicographer and published under the imprimateur of the University of Oklahoma Press

A remarkable thing about this book is that it was written by a woman, Lalia Phipps Boone. As a young woman she went to East Texas to teach school but was shocked by the language of her young pupils, all children of oil-field workers. As she remarked in the preface, childhood in a Methodist parsonage had not prepared her for anything like that. As a hobby she started a list of words peculiar to oil. Later she married an oil man and did postgraduate work in language, and finally undertook a serious compilation of a real petroleum dictionary. Apparently her sex didn't cramp her style much, because the book contains some real surprises.

As a student of language, Mrs. Boone was intrigued by the freshness, vigor, and originality of oil men's talk. They made nouns out of verbs and verbs out of nouns; abbreviations out of phrases and words out of abbreviations; and added or dropped prefixes and suffixes as convenient. They borrowed words from other occupations and changed their meaning, they coined new words with abandon, and they took delight in applying an odd slang phrase to a tool or a situation and making it stick as part of the accepted vocabulary.

What struck us when reading this dictionary and the author's introductory explanation was that a great many of the words which oil men use every day without a second thought originated in slang or improvised usage. They are now an essential part of the industry's working vocabulary, but they must sound mighty perplexing to an uninitiated layman. Such terms as *wildcat, scout, roughneck, tool pusher, cathead, fish, doghouse, tour, spud, and mud,* for example.

Some other occupations, railroading notably, have their own esoteric vocabularies. But we doubt that workmen's lingo in any other industry ever achieved the respectability and universal usage that took place in the oil industry.

Our lingo, like other aspects of our industry, demonstrates how oil grew not by following established rules and theories but by improvisation, ingenuity, trial and error, and the individual resourcefulness of the men on the job.

Reading this dictionary, it struck us that it would be interesting to mix some of the less-known and slangier terms with words of similar origin but which are now in common usage, and thus emphasize what an odd language we speak. The following item is a small sample.

On the Lazy Bench

SIT down on the lazy bench (said the Old Digger). We're turning to the right and running high, and the slip-stick boys say we're due to hit the pay with just one more round trip. Then we'll skid three locations south where they've staked an offset.

The fair-haired boys have everything figured out for us now. Not like the old yo-yo days. You know I used to be a jarhead before I turned swivelneck. On those cable rigs we had to dress all the time in a sand like this. And even though we watched the bailings for stain we were liable to blow when we topped pay.

Like the time I was roughnecking in the Cushing play. We were M.I.M. and getting ready to spud—but here comes the pusher. Got to meet him in the doghouse and report to the scout czar.

—Henry D. Ralph

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BAKER RETAINER BRIDGE PLUG

Signs of business letdown needn't alarm oil men

THERE is no reason for oil men to be worried about the current talk of a possible impending business recession. The worst that can happen to the oil and gas industry, economists agree, is a slowing down in the rate at which the demand keeps increasing.

Business literature these days is full of signs that inflation has run its course, that the demand for consumer goods is leveling off, that capacity to produce many things is at least equal to consumption. There may be a falling off of business activity, taken as a whole, during the coming months or next year, but if and when it comes it should not have drastic effect on the operations of the petroleum industry.

THE demand for petroleum products is so broadly based that oil is about as "depressionproof" as an industry can be. Everybody, literally everybody, uses petroleum products, directly or indirectly, in one way or another, from cradle to grave. History shows a remarkable stability in oil demand through the ups and downs of general business.

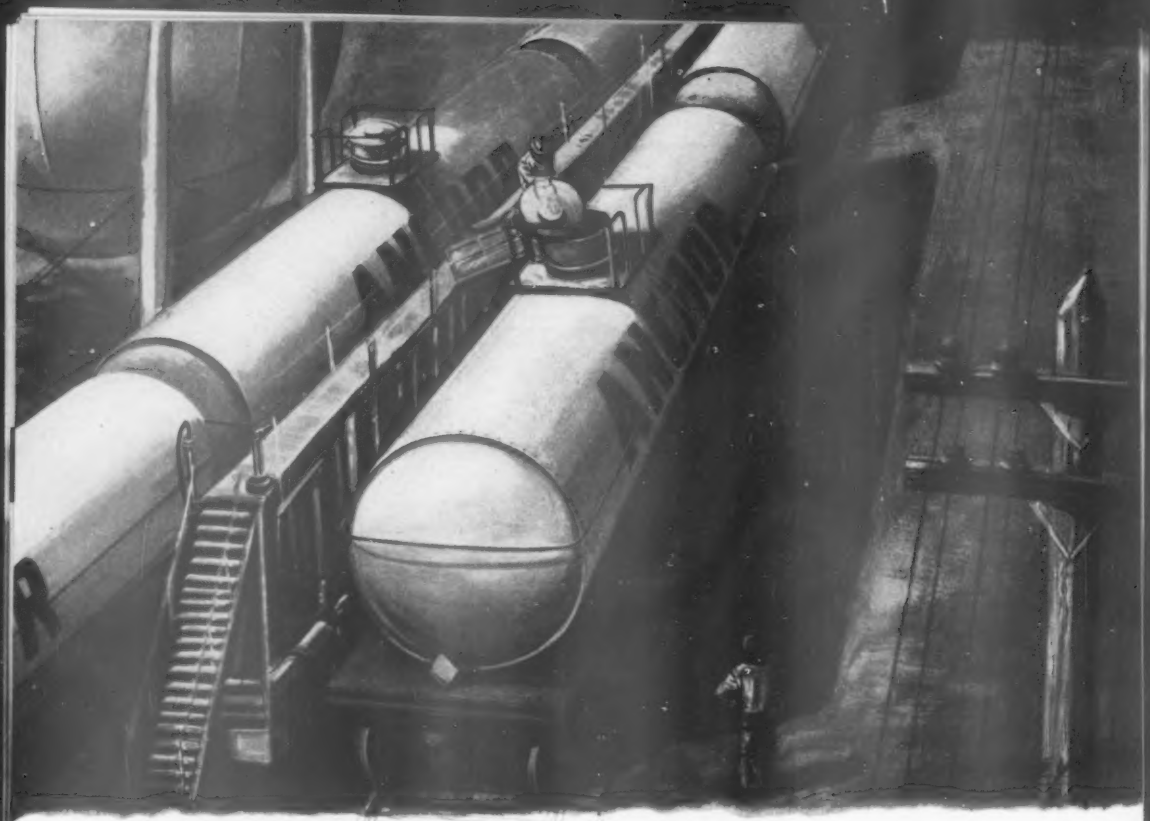
Since the war the United States demand for petroleum products has been going up by 7 or 8 per cent every year—much faster than total industrial production. This rate of growth may not continue. It could drop down to 5 per cent a year, or even 3 per cent, in the opinion of many students of the industry.

So what? That's far from a recession. It's still expansion, though expansion at a less hectic pace. A little letup in the pressure should be welcome. It will permit the industry to catch its breath, to plan more carefully, build more soundly, do a better job all around.

IN recent years the industry has barely been able to keep up with demand, and its reserve capacity has been much too low for comfort. Some slackening in the rate of increased consumption will permit the building up of some standby capacity in production, transportation, and refining. This is highly desirable as a measure for national defense and will provide the industry with a factor of safety.

A little relief from the pressure of consumers will also facilitate the modernization of refineries, pipe lines, and other installations which have been pushed at maximum capacity, so the industry will keep on growing bigger and stronger.

The outlook for oil is good, all in all, despite the prevalent signs of a leveling off of the inflationary boom of the past several years.



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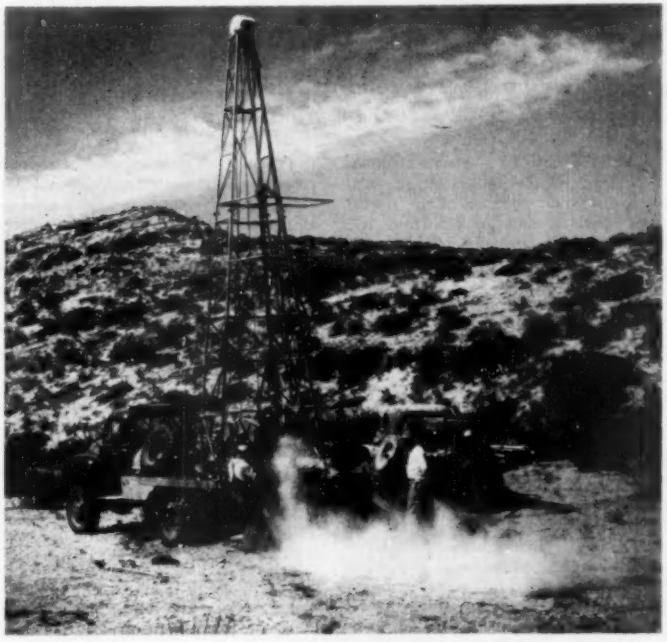
THIS WEEK

TIDELANDS.—Showdown is expected this week in tidelands battle. . . . If Senate overrides President's veto, the fight is over and jurisdiction over the rich submerged oil lands will revert to the states. . . . This is considered unlikely, however, since even the bill's staunchest supporters concede that it is highly improbably that the Senate can muster the needed two-thirds majority. . . . If the veto is upheld, interest will shift to what Interior Secretary Oscar Chapman will do to get tidelands oil development under way again. . . . No action by Chapman is looked for until Congress adjourns. . . .

SUPPLIES.—PAD's Davis tells S.A.E. war would put a heavy strain on this nation's refining facilities. . . . Severe rationing of motor gasoline would be required. . . . Diesel fuel would be equally short. . . . Synthetics cannot be counted on to help. . . . Supplies of products now are generally adequate, except for avgas and residual, but nation has no cushion, Davis says. . . . ¶Fight looms in Texas over July allowable. . . . Many operators want an increase, but Thompson warns further cut may be expected. . . . Operators not expected to be permitted to make up production lost during strike, he adds. . . .



DRY DRILLING is being tried by this Cities Service seismic crew in the arid and rocky hills of Southwest Texas, where water is scarce. This shot-hole rig uses compressed air instead of mud to cool the bit and carry cuttings to the surface as it makes hole for seismograph work. Various operators are experimenting with compressed air to replace mud where water is scarce or because of peculiar rock formations being penetrated . . . an example of the improvisation which keeps the oil industry from becoming set in its ways.

EXPLORATION.—Increasing cooperation between geologists and geophysicists is making oil-finding more efficient, Morgan Davis tells S.E.G. meeting. . . . Formula for continued success, Davis says, is combination of optimism, technical skill, willingness to take risks, and a philosophical viewpoint by company executives. . . . ¶Anticlinal theory of accumulation is just one example, Shell scientist says. . . . Oil and gas also may occur, he says, in unclosed structures of several types. . . . ¶Seburn-Washington spuds important wildcat 50 miles inland from coast of Washington. . . . Test will go to 6,500 ft. . . .

INTERNATIONAL.—Weakness in tanker market believed responsible for reported attempts to move Iranian oil. . . . Spot market now ranges from the U.S.M.C. rate to that rate plus 15 per cent, compared with rates last winter of U.S.M.C. plus 200 per cent. . . . Latest reports say Argentina has arranged to take 1,400,000 bbl. . . .

GOVERNMENT.—Quick steel strike resulting from Supreme Court's ruling that the President did not have constitutional authority to seize the steel industry causes OPS to place back in effect its off-again-on-again order banning deliveries from warehouses for consumer products. . . . The strike won't hurt the oil industry badly for some time due to favorable inventory position, but pipe mills and fabricators haven't enough to keep going for any considerable period. . . . ¶OPS shows no signs of weakening in its stand against decontrolling crude prices. . . . I.P.A.A.'s current drive for decontrol is not expected to result in any more satisfaction than was achieved during an earlier conference with OPS. . . .

NATURAL GAS.—Texas Eastern drive for reserves revealed in three large deals this week—two with Delhi Oil Corp., one with a group of companies holding tidelands acreage off Galveston's West Beach in Texas. . . . Rights are acquired to 8,800 acres of partially developed leases in Duval, McMullen, and Live Oak counties along the Wilcox trend in South Texas. . . .

ACTIVITY.—Data on crude production for week ended May 31 are not available . . . ¶Total well completions for the week increased 39 wells to 935. . . . Wildcat completions dropped 19 wells to 191. . . . ¶Rotary rigs operating in United States on June 2 amounted to 2,807 rigs compared with 2,811 for previous week and 2,511 for corresponding date last year. . . .

TRENDS.—Stocks of four major products totaled 230,433,000 bbl. on May 31, a drop of 33,280,000 bbl. in the 5-week period since refinery information was last available to A.P.I. for weekly reports. . . . Stocks are 30,165,000 bbl. less than on same date last year. . . . For the 5-week period gasoline stocks decreased 33,473,000 bbl., kerosine increased 504,000 bbl., distillate decreased 308,000 bbl., and residual decreased 3,000 bbl. . . .

What War Would Mean

There's no reserve refining cushion, Davis says; motor gasoline, diesel would be critical and severely rationed

ATLANTIC CITY.—Product supplies are generally adequate throughout the world, but the drain of the Korean war and the lack of oil from Iran means there is virtually no cushion of reserve capacity to take care of any new emergencies, C. E. Davis told the Society of Automotive Engineers here last week.

Davis, assistant deputy petroleum administrator for domestic operations, said the only immediate trouble spots are the short supply of residual fuel and the unsatisfactory aviation-gasoline situation.

Aviation gasoline . . . Shortage of supply and increasing quality demands in aviation gasoline will have to be met largely by installation of new alkylation plants and rehabilitation of idle plants, together with use of as much aromatic-type blending agent as present specifications will allow, Davis said.

Use of the aromatic materials has been rather minor because of limited availability and high cost, as well as low lean rating by the F-3 test, but the installation of 200,000 to 300,000 bbl. per day of catalytic reforming capacity within the next few years with resulting potential production of aromatic concentrates will do much toward solving the availability and cost problem.

Davis predicted that in an all-out war the practice of supplying 4.6 cc. of tetraethyl lead and military-volatility aviation gasoline to commercial use will be followed, as during World War II. If no such war occurs, he added, the PAD order requiring a minimum of 4 cc. of TEL in commercial aviation gasoline will be dropped when total demands can be met.

Motor gasoline . . . All-out war also would bring severe rationing of motor gasoline and the freezing of octane numbers at whatever level necessary to allow reasonably satisfactory operation of most cars and trucks on the road at that time, Davis continued.

Over-all petroleum supplies are expected to be very critical during the initial period of an all-out war and steps would have to be taken to discourage or prevent the use of certain octane-improving processes which reduce total liquid volume.

The over-all consumption of normal gasoline components for aviation fuels, including butylenes and butane used in alkylation, is not expected to affect greatly motor-gasoline volatility, so gasoline of usable octane number and volatility will be available "but only in limited quantities."

As a result of civilian gasoline rationing, however, there would be enough TEL manufacturing capacity to supply high-octane aviation gasoline, military motor gasoline and civilian motor gasoline.

Because of the possibility of loss of manufacturing capacity or reserve stocks during a war, however, PAD is studying the advisability and the mechanism of further dispersal of the strategic reserve supply of TEL, Davis disclosed.

Diesel fuel . . . Much the same wartime situation foreseen for motor gasoline would develop in diesel fuel.

Jet fuel, domestic heating oil, and residual fuels would all compete with diesel for the middle-of-the-barrel fraction, and residuals would be blended with distillates below usual viscosity levels to extend the supply to meet wartime requirements.

Since jet engines can also use gasoline fractions, Davis explained, it would be possible to minimize the requirement of distillates for jet fuel, but it might be necessary to use gasoline-powered rather than diesel-powered installations wherever possible.

Synthetics . . . Davis warned the S.A.E. not to place much reliance in synthetic fuels as a wartime measure.

Pointing out that the Bureau of Mines estimates that a 30,000-bbl. a day oil-from-coal plant will cost over $400,000,000, he said it would cost billions to increase our liquid-fuels capacity by only a small percentage. "In the light of this," he said, "it would seem apparent that no quick or easy solution to our problem of supply lies in the direction of synthetics."

Lube oils . . . With the increasing capacity for production in the United Kingdom, France, and Italy which will cut imports from the United States in half by 1955, the total demand for lubricating oils in 1955, both domestic and export, could be met under our limited defense expansion program with present capacity, Davis said.

However, he explained, this comprehends only quantity, not quality. Our solvent refining facilities have been operating virtually at capacity since July 1950 and the trend toward high-V.I. oils is expected to continue. The major portion of the increased demand, expected to amount to 25,000 bbl. daily by 1955, will have to be supplied from new solvent refining facilities which are contemplated in PAD's expansion program.

"It is unfortunate that right at this particular time we appear to be entering one of those periods characteristic of the lube oil business in which a general liquidation of consumer inventories is occurring," Davis commented.

"Historically, supply and demand fluctuate widely, with demands dropping when supplies are plentiful and increasing when supplies become scarce. Until this liquidation is completed, refiners are reluctant to undertake expansion programs and invest capital from which there is no immediate prospect of return. However, if history repeats, demand by distributors and jobbers will again rise to a peak in 1½ to 2 years."

Related products . . . All metallic components required for production of lubricating oils, additives, and detergents are in adequate supply with the exception of barium, Davis said.

Of the various chemicals used, only sulfur and sulfuric acid are in critically short supply.

Phenol and furfural for solvent refining are adequate now and additional manufacturing capacity is under construction; benzene and toluene are available, and while methyl ethyl ketone for dewaxing may become a little short, several major producers are planning expansions.

Capacity for absorbent clays also has been increased and "everything seems to be well in hand except additional solvent refining capacity."

Nevada Leases Issued

RENO, Nev.—Oil and gas leases on approximately 1,395,000 acres of Nevada lands have been issued since last December 1 by the Federal Bureau of Land Management here.

Most of the leases were in Elko County, but activity has spread to Clark, Eureka, and White Pine counties, all in the northeastern part of the state.

Facts of Engine Life

"Hot" rings give quick, accurate measure of wear, S.A.E. told; lube-oil additives tend to reduce wear significantly

ATLANTIC CITY. — Why engines wear, how they wear, and what to do about it—these recurring questions occupied the attention of oil and automotive engineers attending the annual summer meeting of the Society of Automotive Engineers here last week.

Seven papers presented at the Fuels and Lubricants Committee session shed new light on how lubricants and additives affect engine wear. They further confirmed the accuracy of new rapid laboratory tests.

The oil industry has heard much about the new "hot" piston ring method for getting a quick check on ring wear. At this meeting, first reports of comparable results from such laboratory readings and from wear measurements in actual field operation indicated that the rapid method gives satisfactory correlation.

Tests correlate . . . H. R. Jackson of Atlantic Refining Co., which developed the radioactive piston ring technique, reported on two separate full-scale wear-test programs and their relation to the laboratory tracer tests.

One compared a COT laboratory engine and a full-scale, multicylinder two-stroke diesel engine, both operating with Arctic oils. The other concerned passenger cars each equipped with one irradiated piston ring, driven in normal to-and-from work service.

In both of these tests, concluded Jackson, the single-cylinder laboratory engine tracer tests permitted the rapid development of wear-reducing oils whose performances were later confirmed in full-scale tests.

F. W. Kavanagh, of California Research Corp., reported further substantiation of laboratory vs. field correlations for ring wear, using two heavy-duty motor oils and one premium motor oil. He found that wear rates of "hot" rings in the laboratory engine as influenced by lubricating-oil type, correlate with the wear rates of cylinders in 21 taxicabs using the same oils.

Engine-wear study . . . Engine wear is now the major factor limiting engine life, concluded engineers of Esso Laboratories. They investigated basic reasons why passenger-car engines were brought into shops for overhaul and found that 57 per cent were brought in solely because of excessive engine wear, 20 per cent came in because of wear and deposits, and 8 per cent because of wear and mecnanical failure. They found, on the average, that a car's engine lasts only half as long as the car itself.

Having established engine wear as the primary factor limiting a car's life, they then investigated causes of the wear. Piston-ring surface characteristics for three types of wear were obtained in controlled laboratory tests in order to provide a pattern for examination of rings worn in field operations. These tests on a Lauson engine were made under conditions of (1) high temperature friction, (2) abrasion, and (3) low-temperature corrosion.

In examining field rings, they found that by far the biggest proportion of field engines appeared to have worn by friction and abrasion. Low-temperature corrosive wear was observed in only 10 per cent of the engines. Not satisfied, they tested four light delivery trucks over a 2-year period of service in northern New Jersey. Trucks were parked outside at night during the winters to assure good low-temperature conditions.

Their prior conclusions were substantiated, for the wear rates using three lubricating oils all compared to the high-temperature conditions found in the laboratory. Hence they conclude that while wear rates are high in laboratory tests run at controlled jacket temperature of 60° F., low-temperature corrosive wear does not seem to play an important part in wearing engines in average field service.

These findings enhance the importance of lubricants, for they indicate that prolonged engine life can be realized through the development of lubricants which will reduce friction type wear.

Additives study . . . Effects of additives on engine wear were reported from research conducted by Lubrizol Corp.

Under the direction of J. L. Palmer, 15 cars were tested for a period of 15 months during which time each car covered approximately 14,000 miles. The use of a heavy-duty crankcase oil in the MIL-O-2104 quality range, he reported, has the following effects on engine wear and engine deposits, when comparison is made with a nonadditive oil:

1. Piston-ring wear is reduced, on the average by 37 per cent.

2. Cylinder-bore wear is reduced, on the average by 42 per cent.

3. Engine cleanliness is significantly improved. In terms of CRC merit ratings, the cleanliness is increased on the average from 53 to 78.

Wear-measurement study . . . The relative merits of physical, chemical, and radioactive methods of wear measurements were discussed by C. C. Moore and W. L. Kent, of Union Oil Co. of California.

They employ the chemical method, analyzing the used oil for the iron worn from the moving parts of the engine. By this method, they are able to determine change in cylinder diameter of 7 millionths of an inch with an accuracy of 3 or 5 ten-millionths of an inch.

Thus they are able to obtain significant wear values in short engine tests of 50 to 100 hours, without dismantling the engine. Where does the iron in the lube come from? Union engineers have satisfied themselves that it comes from cylinders and rings, because actual wear measurements taken after extended tests agree with their chemical test results in numerous instances involving comparable operating conditions.

Union does not assume that ring and cylinder wear are necessarily equal under all types of operating conditions. They also point to a possible disadvantage of the highly sensitive radioactive method. Because wear values may be obtained with such short runs, there is a tendency to overlook the influence of the factor of oil deterioration on wear rates. They further recommend the chemical method as one more easily applied to any engine in the laboratory or field on a moment's notice with no other preparation than setting up the test conditions and taking the oil samples.

New Company

Texas General already has 30,000,000-bbl. reserves

HOUSTON.—A new exploration and producing company with a capitalization exceeding $30,000,000 is being formed by, primarily, a group of prominent Houstonians.

The company, Texas General Production Co., already has a daily production of more than 7,000 bbl. in Texas and southern Oklahoma and has 30,000,000 bbl. of proven reserves.

The new firm has a seismic crew already at work on an 88,000-acre block in Saskatchewan 20 miles from the recent Woodley-Socony strike. This exploration project is a joint venture with Federated Petroleums, Ltd.

In addition to the Canadian hold-

ings, Texas General has more than 300,000 acres scattered through the Williston basin, 20,000 acres in the Delaware basin, and exploration rights on substantial acreage in the Denver-Julesburg basin.

Fladger F. Tannery, former assistant comptroller with Humble Oil & Refining Co., is president of the new company. Other officers include W. B. Taylor, president of Johnston Testers Corp., chairman of the board; O. W. Ward, formerly with Johnston Testers, vice president in charge of production; C. C. Bankhead, Jr., Abilene geological consultant, vice president in charge of exploration; Eugene J. Wilson, Houston attorney, secretary and treasurer; and J. A. Taylor, assistant to the vice president and drilling superintendent.

MAKING ARRANGEMENTS for last week's process-instrumentation symposium at the A. & M. College of Texas were, left to right, W. B. Rawson, Maintenance Engineering Corp., Houston; J. G. Dobson, Foxboro Co., Foxboro, Mass.; Dr. S. S. Shaffer, Humble Oil & Refining Co., Baytown, Tex.; E. D. Mattix, Cities Service Refining Corp., Lake Charles, La.; and L. C. Books, Shell Oil Co., Houston.

Waste-Disposal Design

Demands growing for better systems; use of instruments can help provide most economical setup, processors told

Gerald L. Farrar

COLLEGE STATION, Tex. — State regulations regarding disposal of industrial waste streams are in general being tightened, and greater attention to this problem is required, John G. Dobson of the Foxboro Co. said here last week.

Addressing the seventh annual instrumentation symposium sponsored by the Department of Chemical Engineering at the A. & M. College of Texas, Dobson said the most economical disposal system is one which is carefully designed and instrumented.

While it is possible to make a net profit on some disposal processes, due to recovery of valuable byproducts, many waste-disposal processes result in monetary loss. In such cases, the overall net cost may be reduced to a minimum by careful planning, he said.

Three applications . . . There are three ways in which instruments may be used in industrial-waste applications, Dobson said.

. . . **First is in surveying** plants to determine both the design requirements for a proposed installation and to indicate the process operations that can be modified to minimize the quantity or concentration of waste being discharged.

This step is often omitted, he said, in that some industrial plants take no action until forced to do so by state regulatory agencies. It is then too late to make an adequate survey, and waste-disposal systems must be installed without adequate design data. The result, he added, is that the system is not so economical as it should be.

. . . **Second is to monitor** waste at various possible sources in the plant, thus minimizing the amount of waste sent to the treating plant, Dobson said.

Often large quantities of storm water or cooling water are allowed to mix with waste streams, he said, thus greatly increasing the volume of material to be treated in the waste-disposal units. Careful monitoring, said Dobson, can be used to locate such points of confluence, and the streams can be separated.

. . . **Third is to control** of the various processes used for treating industrial waste. Most instruments are utilized in this manner, he said, and this type application accounts for much greater outlay of money than the other two types.

Careful and adequate control of the disposal processes can save in initial equipment outlay, maintenance of required equipment, and operating costs such as cost of chemicals and utility requirements, Dobson said.

Survey work . . . A survey should be made to determine what material must be treated and to provide the designer with information regarding quantity and concentration of materials to be handled, Dobson said. Metering of liquid wastes may be done with ordinary flow meters, he said, but it must be remembered that variation of flow from hour to hour must be known in order to size treating equipment properly.

Determination of amounts of waste produced by each section or department of a plant is of extreme value in plant design, Dobson said.

For instance, he said, some plants have a mild acid waste from one department and oil waste from another. If a composite sample is relied upon, some treatment process capable of handling both wastes is required. If, however, the wastes are separated, an upflow type of lime filter may be applied to the acid waste, and mechanical separation equipment may be utilized for the oily waste, he said.

Determinations of concentrations and identities of the various constituents of the waste may be quite difficult, Dobson said. The ideal method would provide a continuous record of all important constituents in the waste; however, he pointed out, instruments for such purposes are usually unavailable.

For example, measurement of electro-conductivity of the solution provides some measure of the total soluble salts being discharged, but does not accurately mirror actual concentrations. Various combinations of the components present can result in solutions which have the same electro-conductivity, he explained.

Similarly, Dobson continued, determination of pH can give information with regard to sudden changes of acid or alkali discharges into waste streams. However, when acids and alkalis are discharged simultaneously, coincident changes in the flow rates of the two streams can result in combined solutions of the same pH, but vastly different concentrations, he said.

However, measurement of both conductivity and pH of the waste solution can show either or both types of change, Dobson said.

Process Training

Thorough fundamental knowledge of instrumentation and automatic control required of process engineers today

One of the principal papers presented at the A. & M. College of Texas instrumentation symposium held last week in College Station was that of Gerald L. Farrar, engineering editor of The Oil and Gas Journal. Farrar, who has had considerable experience in instrumentation work with Magnolia Petroleum Co., was a member of the chemical-engineering faculty at A. & M. College of Texas before joining the Journal. Presented here are highlights of the paper.

THE process engineer must have a thorough, fundamental training in in the science of instrumentation and automatic control. This includes sound engineering and mathematical analysis of the various principles involved, coupled with extensive laboratory training.

Training in instrumentation and automatic control should begin with the over-all analysis of a simple controlled system. There are four interrelated parts comprising this system. These are the measuring element, the controller, the control element, and the process.

The measuring element . . . Principles of operation of the various commonly used elements for measurement of temperature, pressure, liquid level, and fluid flow should be considered in detail. Advantages, disadvantages, and limitations of these elements should be stressed.

Responses of the various measuring instruments, and the consequent time lags brought about by the nature of these responses, can cause the success or failure of the entire control system. If the time lag is excessive, it is impossible to control the process variables satisfactorily. Proper application of measuring elements, then, is the first requisite of a successful control operation.

Appreciable time lag often occurs in application of temperature - measuring elements. This is due to the fact that in most heat-transfer processes large amounts of heat are absorbed with little change in temperature. Temperature measuring elements should, therefore, be selected with great care.

Controller . . . The modes of automatic control (or automatic-control responses) should be selected carefully for use in a given controller, since processes of different characteristics have different control-response requirements.

The on-off control mode may be applied where extremely close precision is not necessary. This controller is least expensive, and is quite satisfactory in many cases. Proportional plus reset control is called for when greater precision is desired, but when lag time is not appreciable. If considerable lag time exists in the system, the proportional plus reset plus rate control response should be employed.

Control element . . . It should be pointed out that the precision control valve has the characteristics of a variable orifice, and thus must be carefully designed and constructed. The control valve must never be allowed to close completely, since the metal-to-metal contact would destroy the smooth faces of valve stem and plug and thus destroy the exact flow characteristics.

In order to function properly, at least 50 per cent of line pressure drop must be available to be taken across the control valve.

Process . . . The process characteristics of main interest in automatic control are capacity and transfer lag.

Capacity of a process is a measure of its ability to absorb energy per unit of process variable potential. The trainee should understand that flow processes usually have little capacity, pressure processes usually have moderate capacity, and temperature and liquid-level processes usually have comparatively large capacities. The larger the capacity of a process, the larger its process time lag, and the more difficult it is to control.

Transfer lag is brought about by a limited rate of energy transfer from one capacity to another in a system. For example, an oil-to-oil heat exchanger contains two capacities, the cold-side capacity and the hot-side capacity.

Experimental setups . . . Instruments and equipment for experimental work in process control should be selected solely for that purpose.

Too often the inclination is to attempt to use a given instrument for a specific process application, as well as for experimental work. Such practice robs the experimental system of versatility which is needed to cover adequately the various situations which may be encountered in automatic control of processes.

The experimental setup should provide for both liquid and vapor phase pressure control. The liquid system has little capacity, while the vapor system can have appreciable capacity. Effect of capacity variation can thus be determined.

Liquid level control should be effected by both of two methods: (1) Controlling the inflow stream and (2) controlling the outflow stream.

Cost Short Course

Contractors told accounting methods hold key to profits

Walter Rose

HOUSTON.—A subject of paramount interest to drilling contractors—cost and cost accounting—was discussed in detail here last week at the first short course on the subject sponsored by the American Association of Oilwell Drilling Contractors.

Similar meetings will be held in the future at other local A.A.O.D.C. chapters. Object of the meetings is to get drilling contractors and oil - company representatives together to consider how rising costs are complicating the problems of the drilling industry.

Discussion was led by H. D. Edwards, of Arthur Young & Co., Tulsa, who told his listeners they should view the drilling rig as a "hole-making factory" and apply generally accepted concepts of cost and cost accounting.

"The drilling industry now is a two billion dollar a year business," Edwards said. "Costs have been increased 60 per cent in the last 5 years, but the difference between profit and loss can depend upon the soundness of the accounting methods used."

One major problem facing industry arises from the difficulty of predicting future replacement costs, Edwards said. Another complication is due to the variable life of drilling equipment which makes future scheduling of replacements indefinite. Variable life is due to variable type of use given to equipment and to the sometime unanticipated obsolescence of equipment by engineering developments.

Depreciation . . . The topic which developed the most discussion was the question of depreciation. Recognizing that equipment can be depreciated only down to what will be allowed as the salvage value—generally 10 to 20 per cent of original cost in the drilling industry—it was conceded that all bids should include generous allowances for depreciation, even on equipment which had already been depreciated for income tax purposes to the maximum amount.

Move to Override

Senate about ready to try wiping out tidelands veto

WASHINGTON.—The Senate is expected to tackle the big job of overriding the President's veto of the tidelands legislation this week.

The 50-35 vote by which the measure was passed last month showed that a number of senators would have to change their minds if the necessary two-thirds vote required to override a veto is to be secured, and even the staunchest supporters of state ownership have little hope this can be accomplished.

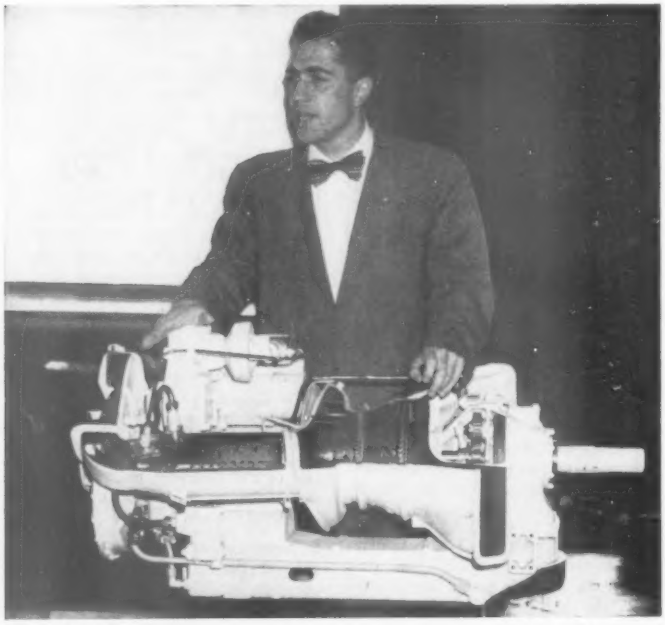
If the veto is upheld, as expected, Sen. Joseph C. O'Mahoney of Wyoming plans to press for action on his resolution for interim federal administration of the tidelands oil properties. He is given little chance of getting it through Congress, however.

If no override . . . Failure to override the veto will shelve tidelands legislation for the year, and interest then will turn to what Interior Secretary Oscar Chapman may do to get tidelands oil development under way.

Chapman is not expected to make any move until Congress adjourns, since any effort to exert control immediately would probably be quickly countered by "stalemate" legislation.

Chapman has never acknowledged he has no power to grant leases in the offshore oil lands, and the department's legal experts have made studies of all the laws it administers to see if there is a loophole for the exertion of federal authority.

In a recent television interview the secretary said he has refrained from taking action because he wished to have guidance from Congress, but refused to say whether he would attempt to exert his power if the legislation was vetoed.



Turbo-Jet Studied for Drilling Rigs

A gas-turbine engine which weighs only 200 lb. but delivers 175 hp. is being studied by Franks Manufacturing Co., Tulsa, for possible use as the prime mover in portable drilling rigs because of its relatively light weight. S. R. Shannon, sales engineer of Boeing Airplane Co., Seattle, here demonstrates a cutaway model to Franks engineers. The turbo-jet section on the left has no physical connection with the power turbine and reduction gears on the right, so it is impossible to stall the engine. Boeing's output is now going entirely to defense, but it expects to place a few units on the industrial market early next year.

Steel Halted Again

NPA bans deliveries as steel strike resumes

WASHINGTON. — The short range outlook for steel for the oil and gas industry was clouded this week as steel-industry management and labor sought a common ground for settlement of their wage dispute.

The Supreme Court's 6-3 opinion that the President was without constitutional authority to seize the industry brought an immediate stoppage of production throughout the country. With only a month to go before the opening of the third quarter, a strike of even moderate length would cut into supplies for oil operations this summer.

Inventories good . . . With one near-strike and a brief walkout ended when the President seized the industry in April, a considerable volume of production already had been lost when the workers walked out again June 2. That did not cut into the oil and gas industry too severely, however, because of favorable inventory position but the pipe mills and other fabricators for the industry are not believed to have enough steel on hand to carry them for any considerable period.

What the administration and Congress would do was still an unsettled question at the week end. The National Production Authority's on-again-off-again order banning deliveries from warehouses for consumer products was immediately put back into effect, but beyond that there was no quick reaction.

The Supreme Court pointed out in its opinion that the President still had opportunity to use the injunctive provisions of the Taft-Hartley Act in an effort to get the steel workers back on their jobs, but T-H is anathema to Truman and the unions alike and he is not likely to use it unless forced.

Settlement sought . . . The Wage Stabilization Board, whose big award to the unions precipitated the impasse which led to seizure, is out of the picture, and the President's most likely move was a conference with top management and labor. Any effort to secure legislation giving the President authority to seize industries is not meeting a very favorable reception in Congress at the moment.

Meanwhile, supplies of steel in warehouses and in industry are relatively high and the immediate effects of a

short strike may not be serious. But if the mills are idle for even a few weeks the result will be a severe curtailment of industrial operations generally. However, there is some feeling in Washington that management and labor, now they are free from government interference, may quickly get down to serious bargaining and reach an agreement before the full impact of the strike is felt.

OPS Not Budging

I.P.A.A. again rebuffed in bid for oil decontrol

WASHINGTON.—Representatives of the Independent Petroleum Association of America held another conference with Price Stabilizer Ellis G. Arnall last week to discuss decontrol of crude prices, without any immediate indication they would gain their objective.

The I.P.A.A. has charged that the Defense Production Act contains no authority for control of petroleum prices, but does contain provision for price decontrol of materials where continuation of controls is defeating the expansion of productive capacity needed for accomplishment of the defense program, a situation which it is contended applies to oil.

Following an initial meeting with Arnall, the association filed a detailed statement of its position and what it deemed the situation to be and asked for another conference.

Talks continue . . . In response, Arnall agreed to a meeting, but asserted "it is doubtful at this time if, under the existing regulations, any increase in the price of crude petroleum will be allowed." Also, said Arnall, "we doubt that the proposed decontrol which you have asked for can be granted under the regulations as written or under the Defense Production Act of 1950, as amended."

Legislation for extension of the act is now before Congress, with amendments pending which would require termination of price controls on any material which is in ample supply or which is not being allocated or rationed.

Approval of such an amendment would require the lifting of controls on a large variety of commodities, including petroleum.

Arnall recently termed "absurd" complaints made by some in the industry that crude-oil price ceilings have operated against the expansion of production. He said no facts have been submitted to OPS to indicate that any price increase is necessary.

WATCHING WASHINGTON

Bertram F. Linz

Bumping the Empty Peg

Just like any ordinary motorist, the Air Force forgot to fill its tank.

As a result, it had to ask Congress to please give it more money in a hurry to buy 1,800,000 bbl. of fuel.

It seems that in figuring its requirements for fiscal 1952, the Air Force forgot that when a new plane is delivered, or one is brought out of storage or modified, it needs gasoline before it can get off the ground.

To make up for this slip, however, the Air Force spokesman who was testifying before a congressional appropriations committee gave the congressmen something to think about when he asked more money for transportation on account of something he called "overprograming."

George Cline Smith of the U. S. Chamber of Commerce, who read every word of the hearings, found this particular gem.

If the Air Force doesn't get the money, the committee was told, "we will have to deobligate certain funds which have been assigned for procurement of items in this appropriation and which are probably being procured through the Army or Navy in order to have the funds so that we will not end up the year overobligated."

Apparently feeling this was not quite clear enough for the limited understanding of civilians, the major general who was testifying went a little further.

"That will mean that we will have to deobligate where the obligation has not, in fact, been incurred," he explained.

"If anyone, either in or out of Congress, can figure out how an overprogramed agency which has become overobligated can deobligate unobligated funds, we would be much obligated," Smith wailed.

Change of Pace

President Truman showed great and unexpected restraint in vetoing the tidelands bill.

Instead of repeating his attack on the "oil lobby" and the charges of "daylight robbery on a colossal scale" which he had made in his speech before the Americans for Democratic Action only 12 days earlier, his only mention of the oil industry was that the equitable interests of those holding state-issued leases in the submerged lands should be protected.

But while Truman was quite temperate and raised no new issues to create additional antagonism in Congress, he did dig out and dust off the old one about our running out of oil.

The President also intimated the states would not know how to conserve the oil if they got the tidelands back. According to military views which he passed on to Congress that would be accomplished by sealing in the offshore oil. The bill passed by Congress, he charged, would not make sure that our oil resources in the Continental Shelf are not dissipated before any war comes, while the O'Mahoney-Anderson measure for federal administration would permit the reservation of unleased lands and offer "priceless opportunities for conservation and other safeguards necessary for national security."

Flood of Rubber

World natural and synthetic-rubber production this year, outside of the Communist orbit, will be some 275,000 tons greater than consumption, but, while the excess is expected to be absorbed into governmental and commercial stocks, the rubber industry is concerned over what may happen in 1953 if output continues to rise faster than demand.

The figure was developed by the International Rubber Study Group which has undertaken studies to determine whether measures designed to prevent burdensome surpluses or serious shortages of rubber are necessary and practicable by international agreement.

Meanwhile, the Reconstruction Finance Corp. is preparing to develop a program for selling the Government's synthetic industry to private industry within the next year or two. The plan will be worked out with leaders of the rubber, oil, and chemical industries —the most likely buyers of the plants, if they are sold. At least one oil company has been reportedly ready to purchase one or more of the butyl plants.

Product Exports Drop

WASHINGTON.—Product exports dropped to an average of 177,000 bbl. daily during the week ended May 9 from 216,100 bbl. daily the preceding week, according to figures compiled by the Petroleum Administration for Defense.

The drop was due to the cutting off of aviation gasoline exports and a sharp decline in residual shipments which more than offset increases in motor gasoline, kerosine and distillate.

Average daily shipments for the week, compared with the week ended May 2, and the average for the 4 weeks ended May 9, in thousands of barrels, are shown in the accompanying table.

	—Week ended—		Average
	May 9	May 2	4 weeks
Aviation gasoline		12.0	26.1
Motor gasoline	14.8	4.8	11.3
Kerosine	43.8	19.7	24.9
Distillate	73.4	67.2	69.6
Residual	45.0	112.4	78.5
Total	177.0	216.1	210.4

Over 50 Firms Staff PAD

WASHINGTON.—More than 50 oil and gas companies, large and small, are contributing men to staff the Petroleum Administration for Defense.

A recent PAD survey of the industry affiliation of its men disclosed that 50 of the larger companies have released more than 90 men for Washington service, and a considerable additional number have come from independent operations.

For the most part, PAD asks the companies to send only one man at a time, but where there is a need for specialized knowledge it does not hesitate to call for more. Currently, there are five Gulf Oil Corp. men on the staff and four each from Sinclair Oil Corp. and Standard Oil Co. of California. Seven companies are furnishing three men each and eight companies have sent two each.

The Standard Oil (N. J.) group has seven men on the PAD roll and the Indiana Standard and Texas Co. groups have five men each.

Washington Briefs

John E. Brantly, f Dallas, former president of Drilling & Exploration Co., Inc., Abilene, Tex., has been named assistant deputy administrator in charge of foreign operations of the Petroleum Administration for Defense. He succeeds C. Stribling Snodgrass, who resigned as executive vice president of Bechtel International Corp. in February 1951 to join PAD for a fixed period which has now expired. Following his resignation from PAD, Snodgrass was appointed a consultant to the agency.

Bruce K. Brown, former deputy petroleum administrator, has been named by Interior Secretary Oscar L. Chapman as a member of the National Petroleum Council.

Perry A. Peterson, sales manager for Allied Oil Co. when he joined the Petroleum Administration for Defense in February 1951 as assistant to the director of supply and transportation, has been named assistant director of the supply and transportation division.

Merle Thorpe, Jr., who resigned from the Washington law firm of Hogan & Hatson to join the Petroleum Administration for Defense as assistant to the finance counselor in April 1951, and J. Arthur Kelly, formerly division attorney with the Socony-Vacuum Oil Co., Inc., New York who joined the agency April 15, have been named assistant general counsels of PAD.

SOUTHWEST

Production Fight Looms

Many Texas operators want increased allowables; Thompson says further cuts coming and no makeup will be allowed

HOUSTON.—A battle over the proper rate of crude-oil production during the summer is shaping up for the hearing on July allowables scheduled by the Texas Railroad Commission for June 18 in Austin.

Output was curtailed rather severely during the refinery strike which closed down many refineries during most of May, but stocks of crude increased sharply during that period.

Many producers insist that production should be brought back to a high level in order to avoid a threat of imports and because refineries will have to operate at close to maximum capacity in order to build up stocks of heating oil for next winter's consumption.

On the other hand, Commissioner E. O. Thompson of the Railroad Commission is on record as favoring further cuts in Texas production. The June allowables for the state are 113,000 bbl. per day lower than May. Since March, Texas allowables have been cut by 250,000 bbl. per day.

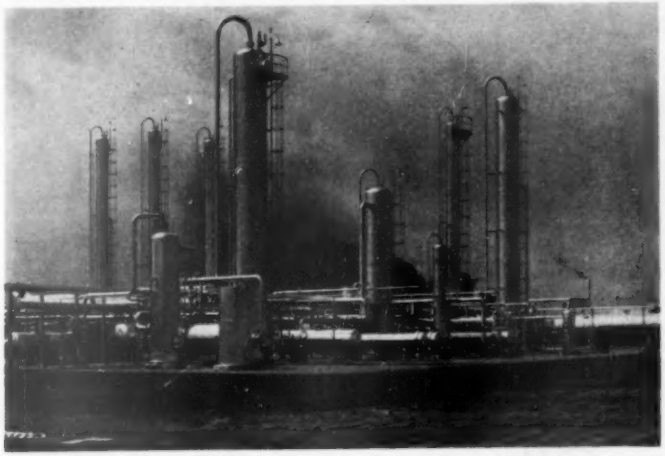
Not yet normal . . . While the refinery shutdowns are virtually ended, crude-oil production in the Southwest is not entirely back to normal except in certain areas. By the week's end, pipeline production had been entirely lifted in Southwest Texas.

This was due in part to the heavy demand for 40°-gravity crude during the strike, which kept storage at low levels in the Corpus Christi area. Also, only three of the major pipe lines serving in the area—Atlantic, Sinclair, and Magnolia—were owned by companies directly involved in the strike. While these lines prorated purchases for a while, Magnolia was fortunate in having large tank-farm facilities which minimized the extent of the proration.

In worst shape are operators in the West Texas-New Mexico area where lifting proration of pipe-line purchases has only slightly improved the recent cutbacks in production of oil. This has been due to the relative inaccessibility of West Texas crude for tanker movements and the relation of its price to quality. Companies still limiting their purchases are reported to include Shell, Texas-New Mexico Pipe Line Co. and Service Pipe Line Co. It was reported in addition that even some of the companies which have announced a 100 per cent resumption in purchase of crude are nonetheless operating below capacity because of the lack of crude storage facilities.

Tankers short . . . A reported tanker shortage at Houston and some other Gulf Coast ports, plus heavy crude stock levels, is holding back production in certain Gulf Coast and East Texas areas. However these regions by the weekend were quickly getting back to normal production levels due principally to the fact the big refiners there own much of the production.

With regard to the production allowable prospects in Texas for coming months, Thompson of the Railroad Commission has indicated that there is no intention to permit operators to make-up production lost during the strike. He indicated that the commission considers it lacks authority to permit production on back allowables.



PROCESSING UNITS of the new Ringwood gasoline plant of Warren Petroleum Corp. and Oklahoma Natural Gas Co. which was formally opened last week. The plant is designed to process 50,000,000 cu. ft. of natural gas daily, yielding a total of 80,000 gal. of liquid products. Construction was begun in the spring of 1951.

Novel Gasoline Plant

Special features required at Ringwood in view of water shortage, leanness of gas, wide distribution of wells

Henry D. Ralph

ENID, Okla.—Several novel features in the engineering of a natural-gasoline plant were displayed to a large party of invited guests at the formal opening of the Ringwood plant near here June 6 by Warren Petroleum Corp. and Oklahoma Natural Gas Co.

Special obstacles which the design engineers had to overcome were: a shortage of water, relatively lean gas, and a widespread gathering area.

These obstacles resulted in abandonment of several proposals for constructing a gasoline plant at Ringwood at various times since development of the field began in 1945.

Ringwood field has more than 200 producing oil wells spread over more than 8,000 acres and the gas is slightly below average richness, yielding somewhat under 2 gal. per M.c.f. However, the size and probable life of the gas reserve and the economy features engineered into the plant are calculated to pay out the investment over a period somewhat longer than normal for plants of this type.

The plant is a joint project of the two companies. Warren designed and operates the plant and handles the liquid products. Oklahoma Natural takes the residue gas directly into its transmission lines.

The plant is designed to gather and process 50,000,000 cu. ft. of oil-well gas per day and yield 40,000,000 cu. ft. of pipe-line gas and 80,000 gal. of liquid products: 32,000 gal. of natural gasoline, 24,000 gal. of butane, and 24,000 gal. of propane.

Water solution . . . The shortage of water was overcome in these ways:

1. Extensive use of air-fan units instead of water towers for cooling engine lubricating oil and jacket water and also for condensing the hydrocarbons in the processing section of the plant.

2. Elimination of a steam power plant by using gas-engine and electric power.

3. Use of direct-fired rich-oil furnaces for plant-process heat. These furnaces have a total capacity of 36,000,000 B.t.u. per hour.

4. Complete elimination of steam in processing. The plant uses lean hydrocarbon vapors to strip the desired hydrocarbons from the rich absorber oil. The usual practice is to use steam for this purpose, but in a number of recent installations Warren has found that this dry-stripping method gives satisfactory results *(see The Oil and Gas Journal, May 5, 1952, page 175).*

Power saver . . . Another novel economy feature is the use of part of the energy released when the rich oil is flashed from the absorber pressure of 750 psi. down to about 250 psi. Part of the rich-oil stream is diverted through a special turbine which drives a centrifugal pump used for circulating liquid products in the plant.

This is believed to be the first time a turbine of this nature has been incorporated into the design of a natural-gasoline plant, and is expected to result in considerable saving of power which otherwise would have to be supplied to operate the plant.

Construction of the Ringwood plant began a year ago and was sufficiently completed to permit partial operations to start last April. Gas-gathering lines from 150 lease separators range from 3 to 36 in. in diameter. Compressor facilities consist of five 2,500-hp., angle-type, gas-engine-driven units (total 12,500 hp.), among the largest compressors of this type manufactured. The plant is located on a railroad line and has storage for more than 500,000 gal. of liquid products in 13 pressure tanks of 1,000 bbl. each.

CANADA

New Syndicate Buys Leases

CALGARY, Alta.—A newly formed syndicate has purchased 1,440 acres of semiproven and extension wildcat crown leases in Canada, principally in the vicinity of Camrose field.

Rainbow Oil, Ltd., which made public the $737,000 deal, said it has a 25 per cent interest in the properties and that others participating are Banff Oil, 25 per cent; Petrol Oil & Gas, 17½ per cent; Central Explorers, 15 per cent; Scurry Oils, 10 per cent; and Diversified Oils, 7½ per cent.

Included in the purchase at a cost of $360,000 was a quarter section in Camrose field which is considered proven due to production established on two sides. It is estimated to yield over 700,000 bbl. of oil on development.

A full section considered to be in the trend of the Camrose Viking sand field, which is producing approximately 1 mile north, was purchased for $276,000.

Three quarter sections were obtained in the Bashaw area and one more in the Acheson area.

LEADING OIL FINDERS attending the Houston geophysical meeting included, left to right, L. L. Nettleton, Gravity Meter Exploration, past president of the Society of Exploration Geophysicists; Henry C. Cortes, Magnolia Petroleum Co., Dallas, charter member and past president of S.E.G.; Roy L. Lay, The Texas Co., S.E.G. vice president; George Wagoner, Carter Oil Co., Shreveport, S.E.G. past president; Morgan J. Davis, Humble Oil & Refining Co., president of the American Association of Petroleum Geologists; Cecil H. Green, Geophysical Service, Inc., Dallas, S.E.G. past president; Curtis H. Johnson, General Petroleum Corp., Los Angeles, president of S.E.G.; Carl L. Bryan, Shreveport consultant, secretary-treasurer of S.E.G.; Sigmund Hammer, Gulf Research & Development Co., Pittsburgh; S.E.G. past president; and Alexander Deussen, consultant, A.A.P.G. past president.

Teamwork Pays Off

Geologists and geophysicists, one-time antagonists, now pooling talents for real oil-finding efficiency, Davis says

Philip C. Ingalls

HOUSTON.—True efficiency in finding oil is being realized through increasing cooperation between geophysical and geological groups in many exploration organizations.

Speaking before most of the 800 geophysicists registered here for the annual Gulf Coast regional meeting of the Society of Exploration Geophysicists, Morgan J. Davis, president of the American Association of Petroleum Geologists, said "a new spirit of teamwork now exists which has largely replaced an older attitude of indifference and sometimes even antagonism between the two groups. With the team spirit there has also come a feeling of mutual respect and appreciation of each other's work."

The entire meeting reflected this "new spirit of teamwork" in that it was difficult to classify many of the papers as either geology or geophysics.

Davis, vice president of Humble Oil & Refining Co. in charge of exploration, said "continued success in exploration depends upon maintenance of an optimistic outlook, real technical skill, a willingness to take large calculated risks, and a philosophical viewpoint on the part of those charged with the responsibility of finding the nation's future oil and gas reserves."

Big job ahead . . . Davis' forecast showed that by 1975 population in the United States will have increased 20 per cent and that total energy requirements will have gone up 30 per cent. As oil and gas are supplying over half of the energy requirements at the present time this means a tremendous job lies ahead.

To answer those who feel that the oil industry cannot meet this challenge, Davis pointed out that it took 66 years to drill the first 700,000 wells and that these wells found only 13.2 billion barrels of oil, only 18,900 bbl. per well; that it took 26 years to drill the next 700,000 wells and that these wells found 57.5 billion barrels of oil, 82,500 bbl. per well; and that the current forecast shows another 700,000 wells will be completed by 1966 which will develop 60 to 65 billion barrels of oil, or about 90,000 bbl. per well.

Davis referred to the first 66-year period from 1859 to 1925 as the infancy of the oil industry and the next period from 1926 to 1951 as early maturity. Daily average production per well in 1920 was 5 bbl.—this had risen to 13.2 last year.

Oil harder to find . . . Oil is getting harder and harder to find as brought out by the fact that though the total number of fields discovered since 1938 has been up the size of the discoveries has been down.

Fields in excess of 10 million barrels of oil are down from about 800 in 1938 to around 300 in the period 1944-48.

Since 1948 the number of the larger fields has been down even further but a true comparison cannot be drawn because it normally takes at least 5 years to get a good estimate on the ultimate recovery of an oil field.

Costs climbing . . . Davis emphasized that the cost of finding oil is going up and up even when expressed in pre-inflation dollars.

The greater depth of wells has played an important part in these rising costs, which now are estimated at about 50 cents per barrel. However, Davis believes "there will be increasing recognition on the part of the regulatory bodies that favorable economics and true conservation of the petroleum resources are closely dependent, one upon the other."

Methods more efficient . . . In summary, Davis said "the industry is finding a lot of oil—enough to more than keep pace with production; enough to build up reserves satisfactorily in the face of large withdrawals, but it is costing more than 5 times as much as it did 15 or 20 years ago to find it.

"Nevertheless, oil finding is becoming more efficient. This has been necessary in order to offset, even partially, the sharply rising costs and to measure up to the needs of the industry in our country.

"A partial answer to how successful this effort has been is the fact that the retail price of gasoline is the same today as it was in the twenties even with the high taxes included in it."

Manpower short . . . In his meeting-opening remarks Curtis H. Johnson, president of the S.E.G., commented

briefly on the critical need for more manpower to help find the petroleum reserves this country is known to have.

The recently installed president called on local sections for active public-relations efforts to aid in attracting students into the field of oil exploration. He pointed out that the demand for geophysical information is constantly growing as indicated by the recent decision of the society to increase "Geophysics," its quarterly publication, from 80 to 172 pages, to microfilm bulletins out of print, and to publish Volume 2 of Geophysical Case Histories.

Occurrence of Oil

Structures with no barrier to updip migration hold it

HOUSTON.—Geologists are going to have to supplement their customary knowledge of structure and stratigraphy with a study of three-dimensional ground-water hydrology, if many accumulations of oil are not to be overlooked.

This theory was convincingly demonstrated by M. King Hubbert, Shell Oil Co., Houston, at the regional Gulf Coast meeting of the Society of Exploration Geophysicists held here May 29-30.

Hubbert showed, both theoretically and experimentally, that the anticline theory of oil accumulation is but a special case and that oil and gas may occur in structural terraces, noses, monoclines, and other unclosed structures entirely devoid of lithologic barriers to updip migration. He said that such traps are known in almost every major oil-producing area.

Migration to traps . . . In the most-talked-about technical paper given at the Houston meeting, Hubbert showed that oil and gas in a dispersed state underground tend to migrate from regions of higher to those of lower energy levels and come ultimately to rest in positions which constitute traps.

If the water is at rest the impelling forces will be directed vertically upward and traps will be the familiar ones of the anticlinal theory. However, if the water is in motion in a non-vertical direction, the oil and gas equipotentials will be tilted downward in the direction of flow with those of the oil inclined at a greater angle than those for gas.

Hubbert illustrated that the impelling forces for oil and for gas will not be parallel and that the two fluids will migrate in divergent directions to traps. In general these will not coincide and may in fact be separated entirely—a trap for oil being incapable of holding gas, and vice versa. *(The Oil and Gas Journal, April 14, 1952, page 215).*

Price Crackdown

Louisiana seeks remedy to gas-purchase irregularities

BATON ROUGE.—Legislation which would provide more-uniform gas prices in Louisiana by plugging several loopholes in current laws is coming up for committee discussion in the state's house of representatives.

Three of the measures were referred to the conservation committee and two to judiciary hearings.

The new bills would stop:

. . . Pressure juggling by pipe-line purchasers (Bill 471) by making it unlawful for any gas buyer to measure it on a pressure base in excess of 15.025 psia. This would prevent purchasers from buying gas at high pressure on a volume basis and then selling at a lower pressure with the accompanying increase in volume.

. . . Price discrimination by purchasers (Bill 470) by making it illegal to pay different prices to different producers of like grades of gas at like pressures.

. . . Producer discrimination by purchasers of gas from a common supply (Bill 475) by forbidding them to refuse to purchase gas ratably from each producer of the common source.

Stiffened penalties for violation are included in all three bills.

The common-purchaser section of the natural-gas code is amended in Bill 472. The amendments would:

. . . Give pipe lines a break by adding (to a provision that they now have to purchase all gas offered for sale—either totally or ratably) the phrase, "which may reasonably be reached by its (common purchaser's) trunk lines or gathering system.

. . . Deprive commissioner of his discretionary right to suspend the requirement for ratable purchase of gas.

. . . Divest purchaser of his right to take action against an owner who refuses to sell gas to the pipe line from a well in a common source of supply.

. . . Let buyer permit use of his lines by any producer for reasonable charge in lieu of paying identical prices for gases of like grade and pressure.

Salt Creek Interest Sold

HOUSTON.—Purchase of the working interest of the Percy Jones Estate in Salt Creek field of Kent County for $11,000,000 was announced last week.

The interest was bought by a group including Continental Oil Co., Rice Institute, M. D. Anderson Foundation, Yale University, Princeton University, St. Pauls School and other organizations represented by J. P. Morgan & Co.

In addition to the Salt Creek working interest, the group acquired a working interest in 15,000 acres of undeveloped land in West Texas controlled by Percy Jones Estate.

General Crude Oil Co., Houston, which has a 40 per cent working interest in Salt Creek field, will continue to be operator of the field.

McGowen Receives Certificate

Dr. E. H. Poteet, president of Texas A. & I. College, Kingsville, presents a certificate of appreciation to N. C. McGowen, president of United Gas Corp., Shreveport, at A. & I.'s seventh annual short course in gas technology, sponsored by the Southern Gas Association. McGowen, principal speaker at the opening session, was one of six men honored by the A. & I. board of directors for service to the gas industry and in development of the short course.

EASTERN

Strike Has Hurt

Stepped-up runs a must to avoid crisis, Warren says

PITTSBURGH. — The 3-week shutdown of refineries last month because of strikes cost the country 65,000,000 bbl. of potential products, new Deputy Petroleum Administrator J. Ed Warren told the Pennsylvania Grade Crude Oil Association meeting here June 5.

Replacement of this loss will require an increase of 200,000 bbl. daily in refinery runs between now and the end of next March, Warren said in his first public address since becoming head of the Petroleum Administration for Defense May 29.

Warren explained that, if the stock losses are to be restored, refineries will have to operate at 93 per cent of capacity over the country as a whole and those in District 3, which was particularly hard hit by the strikes, will have to go to 97 per cent of capacity, "an unprecedented peace-time level for such a long period."

This stepping up will wipe out the increase in inventories which raised crude stocks to a record high of 282,000,000 bbl. during the strike.

Situation critical . . . "If refinery output is not stepped up, we will be in a bad way," Warren warned. "That is particularly true of the East Coast area. There a shortage of house-heating oils, and to a lesser extent of residual, already casts a shadow across all predictions.

"Refinery production of No. 2 fuel oil must be increased immediately and tanker facilities used during the otherwise slack summer months to move this oil to East Coast storage, or we will be in for a bad time."

Warren told the producers it is of "utmost importance" that the ceiling prices on No. 2 oil be raised quickly, "for lack of a change will prohibit the competitive movement of kerosine, No. 2 heating oil, and distillate in general for next winter's use."

Tension growing . . . Briefly reviewing the world situation, Warren said the war in Korea and growing tension on the German borders give substance to testimony of General Omar Bradley, chief of the joint chiefs of staff, that 1954 will be the year of maximum peril. He intimated it will be necessary to continue PAD even beyond that year.

"It seems most unlikely that true peace will come and with it an end to the tensions of the emergency that gave birth to PAD and to the inspiring effort of the petroleum industry in the drive for mobilization."

Allied Forms New Division

NEW YORK. — Allied Chemical & Dye Corp. has announced the formation of a new division to be known as the Nitrogen Division.

Effective June 1, the new branch took over operation of the parent company's two existing nitrogen plants at Hopewell, Va., and South Point, Ohio, formerly operated by the Solvay Process Division.

Two new petrochemical projects, now under consideration, also will be built and operated by the new Allied division. They are a nitrogen plant in Nebraska, which will synthesize urea and other nitrogen products from natural gas, and a Texas plant which will make ethylene glycol from refinery gas.

Hugo Reimer, formerly executive vice president of Solvay, is president of the new nitrogen division. There are two executive vice presidents — Dr. M. F. Fogler, former vice president of Solvay, and F. T. Techter, former vice president of the Barrett Division. Dr. C. S. Fazel, a vice president of the new division, formerly was a vice president of Solvay.

WEST COAST

Interesting Test

New firm spuds 6,500-ft. test in inland Washington

SEATTLE.—A wildcat which will be closely watched has been spudded in the Chehalis area of Lewis County, 50 miles inland from the Bay City area, where most past activity has been.

The test is being drilled by Seburn-Washington Oil Corp. and is located in SE 29-13n-1w, in the Cowlitz basin. It is scheduled to go to 6,500 ft. I. W. Love of Aberdeen is president of the new Washington company.

Union Oil Co. a few years ago assembled holdings in this area and planned a test. It was not drilled, reportedly because the company was unable to secure the cooperation of other companies in pooling acreage. When Union's leases expired recently they were taken over by Seburn-Washington, which is backed by Canadian capital in this venture, according to scout information.

Discovery suspended . . . At present Washington has no oil production. There has been one indicated commercial discovery, but completion efforts have been temporarily suspended.

This is the Tom Hawksworth et al 4 State, in the Bay City area of Grays Harbor County, which last November registered gas flows of 500 to 2,000 M.c.f. daily along with 35 to 100 bbl. of 47°-gravity condensate.

Reservoir pressures in this wildcat ranged as high as 2,700 psi., and in killing these pressures large quantities of mud were used. During the months in which the well was tested, this mud flowed back into the tubing and into mud lines and traps, eventually hardening and sealing off the well. Now the operators are faced with the mechanical problem of cleaning the well.

Union Oil Co., through its wholly owned subsidiary, Los Nietos Co., on July 1 is to make available all data it has developed from drilling several wells in this area.

Wage Agreements Reached

LOS ANGELES.—Shell Oil Co. and the Oil Workers International Union have agreed on a 15-cent wage increase, effective May 1, with a 4.2 per cent increase from January 1 to April 30. New shift differential will be 6 and 12 cents per hour. The agreement is subject to approval of the Wage Stabilization Board.

Negotiators for General Petroleum Corp. and the CIO Oil Workers Union also have reached an agreement covering about 920 company workers—mostly in the firm's Torrance, Calif., refinery.

Annexation Battle On

LOS ANGELES.—Signal Oil & Gas Co. and Southwest Exploration Co. have filed suits in Superior Court attacking an annexation by the city of Huntington Beach of 9 sq. miles of ocean area.

Titled the "Northwest Extension," the area fronts Bolsa Chica and Sunset Beach. Both companies are engaged in developing offshore leases in this area, slanting holes almost 1½ miles from land locations on the beach.

They are seeking refund of taxes paid under protest since the city annexed the area more than a year ago.

Iron-Curtain Report

Production in Romania, world's ninth-rated producer, still dropping; Austria promising, but Hungary's outlook is dim

George G. Rosu

This is the second of four detailed articles outlining conditions in the petroleum industry of the Iron Curtain countries of Europe.

Presented here is an up-to-date account of exploration, production, and refining operations in the three principal countries—Romania, Austria, and Hungary.

Operations in Poland, Czechoslovakia, and Albania will be described in the next issue of the Journal. The fourth and last article will present a detailed analysis of synthetic-fuel manufacture in each of the eastern European countries, with information on plant locations, capacities, and the types of processes employed.

The first article, published in the June 2 issue of the Journal, presented an over-all description of present conditions in eastern Europe.

IN the communist world the Romanian petroleum industry is second in importance to that of Russia.

Romania still takes the ninth place among the world's oil producers. Its ultimate reserves, however, may be now estimated at less than 50,000,000 tons (385,000,000 bbl.), and the proved reserves are under 20,000,000 tons (150,000,000 bbl.).

The steady decline of the Romanian output during the last 15 years is of a structural character and is, therefore, not open to remedies.

Production is still concentrated mainly in the three southern districts, Prahova, Dambovita, Buzau, and the small Moreni-Baicoi trend, which continues to supply more than half of the Romanian output.

Since 1949, greater attention is being directed towards development of the Miocene producing region in Teis, discovered in 1947 by foreign companies. The lack of worthwhile new discoveries forced the Russians to resume and intensify production from many old wells in the southern region which had long been abandoned.

Furthermore, since 1949 there has been increasing activity in the Bacau district. Although the existence of these source beds has been known since the second half of the seventeenth century, little development has been done because of the cheaper production in the southern region and the heavy viscous nature of the Bacau crude. During the last war, however, extensive geophysical exploration was conducted in the Moldavian region, covering the whole area from Campulung and Pascani southwards to Braila and Galati.

Drilling and production . . . The work on the Moldavian structures as well as the reactivation of the abandoned wells halted the declining trend in crude output which last year rose, for the first time since 1943, to 4,900,000 tons (98,000 bbl. per day). If this had not occurred, cumulative production would have dropped to probably 3,000,000 tons (60,000 bbl. per day).

According to earlier studies, in order to stop the downward trend and stabilize production at 4,000,000 tons (80,000 bbl. per day) for a number of years, it was necessary to put in operation an annual average of 118 wells, which entailed development drilling of approximately 320,000 m. (1,050,000 ft.) annually.

The Russians embarked on an ambitious drilling program, as shown in Table 1.

Most of this drilling has been for development, for deepening old or abandoned wells, and for gas production.

The Russians also set qualitative targets to be fulfilled in 1950, namely, to rework abandoned wells and to reduce by a third the monthly decline of the old wells. But the disparity between targets and actual results has been very disappointing, as Table 2 shows.

Organization . . . The 1950 results have been even more disappointing since at the beginning of that year, Sovrompetrol (the state-owned Soviet-Romanian Petroleum Corp.) took over the development of the leases and assets of the former foreign corporations. Only the Bacau region remained in Romanian hands.

Following the 1950 failure—which was climaxed by the ousting of the fuel and mining minister—a new policy was initiated. The entire organization was

TABLE 1.—DRILLING GOALS AND RESULTS

Year—	Target— Meters	Target— Feet	Actually achieved— Meters	Actually achieved— Feet
1948	320,000	1,050,000	304,192	998,054
1949	450,000	1,475,000	519,256	1,703,679
1950	650,000	2,130,000	610,079	2,001,669
1955	1,250,000	4,100,000	...	...

TABLE 2.—PRODUCTION GOALS AND RESULTS

Year—	Target— (1,000 m. tons per year)	Target— (1,000 bbl. per day)	Actually produced— (1,000 m. tons per year)	Actually produced— (1,000 bbl. per day)	Per cent of target
1948	4,500	90.0	4,150	83.0	92
1949	5,115	102.3	4,320	86.4	84
1950	6,780	135.6	4,030	80.6	60
1951	8,020	160.4	4,948	99.0	61
1953	8,600	172.0	...	...	...
1955	10,000	200.0	...	...	...

reshuffled and the whole petroleum industry came under absolute Russian control. This is now exercised through seven trusts, divided into regional and special sections, each directed by a Russian specialist.

This new organization now directs the tremendous efforts being made to increase crude output. Its efforts during the past year were rewarded with an increase of 900,000 tons (18,000 bbl. per day), which was considerably under the target.

Moreover, the ways which this postwar peak production was attained do not vouch for its maintenance during the coming years.

Crude outlook . . . The Russian administration may force known reserves to absolute exhaustion, but the goal of 10,000,000 tons (200,000 bbl. per day) of crude set for 1955 will in all probability never be reached. The technical foundations upon which the Five-Year Plan has been built are very shaky.

The present production picture and the outlook for the future are not bright. Since 1936 the footage drilled each year has nearly doubled. At the same time, however, total production has been virtually halved.

This falling ratio, the huge manpower employed (almost double the prewar figure), and the expensive equipment and materials produced at home have raised considerably the price of crude at the well. But in the Russian orbit, the cost price has ceased to be a determining factor in economic life.

Refining . . . In processing, Romania has always had an excess of refining capacity; but the plants correspond at best to the 1933-36 technical level.

War bombardments did not leave a single plant untouched. After the war, most of the installations were patched up in a great hurry without importing any spare parts from the countries where these units were built.

In 1950-51, the old Steaua Romana plant at Bacau was repaired and redesigned. By 1955 it is planned to build additional facilities, specifically aiming at doubling the cracking capacity. In view of the unsatisfactory condition, there is little hope that such an intensive capital investment will be carried out completely unless these facilities are meant to be used also for imported crude.

Present processing capacity of Romanian refineries is shown in Table 3.

Trends in consumption . . . Because of the absence of black coal deposits of any importance Romanian industry, in general, has been built during the last three decades upon liquid fuels.

Prewar domestic requirements amounted to more than 1,700,000 tons (34,000 bbl. per day) and, during the war, they rose to a peak of 2,300,000 tons (46,000 bbl. per day). They have since stabilized at around 1,400,000 tons a year (28,000 bbl. per day).

Meanwhile, great efforts are being made to substitute lignite and natural gas for oil. Construction of a pipe line connecting the Transylvanian gas deposits with the industrial centers of Brasov and Bacau was started last year. The electrification program also is being pushed. Nevertheless, the substitution program can claim so far only minor success.

Despite drastic cuts in rail transportation and in civilian consumption of electricity, the railways are still taking at least 350,000 tons a year (7,000 bbl. per day), and the thermoelectric generating plants require an additional 250,000 tons a year (5,000 bbl. per day) of residues and products. The conversion of an oil economy to other energy sources takes time and a great deal of genuine investment for transforming or replacing specific industrial installations.

Civilian oil consumption has fallen to the lowest minimum. Since 1945 there has been no private motoring, and the consumption of official cars and motor-pool vehicles is strictly rationed.

TABLE 3.—ROMANIAN REFINING CAPACITY

	(1,000 tons per year)	(1,000 bbl. per day)
Distillation capacity	4,700	94.0
Pipe stills for lubricants	460	9.2
Total	5,160	103.2
Cracking capacity	1,680	33.6

Actual Romanian petroleum export is not exceeding 150,000 to 200,000 tons a year (3,000 to 4,000 bbl. per day) of oil products as compared with over 3,000,000 tons (60,000 bbl. per day) prior to 1944. Since the end of the war, the surplus over minimum requirements has been sent to Russia, either as reparations or as commercial export.

Eastern Austria

The second producing country in importance is the Soviet zone of Austria. It is a sad fate that this country's oil fields are located in the Russian sphere.

The first discoveries were made by three companies controlled by German, Swiss, and United States capital. Commercial production started in 1936, and, 2 years later, Austria was occupied by Germany, which developed these sources for her own benefit.

Since the end of the war, the fields, together with all refining and storage facilities (meanwhile expanded and modernized by the Germans), have been run exclusively by Russia. The Austrian economy is being deprived of an income estimated currently at some $50,000,000 annually.

Production . . . The Russians continued the drilling started by the Germans. Their efforts resulted in the discovery of three new fields: Matzen in 1949, Aderklaa in 1950, earlier known as a gas field, both near Vienna, and last year, the Blockfliess field, south of Danube.

This last discovery strengthens the belief that the Matzen structure continues south and, thus, opens a promising prospect. Two additional discoveries at the turn of the year, at Langenzersdorf and Schwadorf, give further proof of the existence of commercial source beds in this region.

The older Zistersdorf fields produce from more than 550 wells drilled in some seven producing areas located along the Steinberg fault. The most important is Muhlberg, which alone is credited with approximately 20 per cent of the total output.

Last year, Zistersdorf's share amounted to about 73 per cent of the production total. Matzen contributed some 17 per cent. If properly developed, Matzen soon may equal and even surpass Muhlberg's importance. Although Aderklaa field already produces some 500 tons (3,400 bbl.) a day from three of a total of 20 wells drilled, it is too early to make a definite appraisal of its commercial value.

To the end of 1951, ten wells had been drilled in the Blockfliess area, and several more on the last two structures

discovered. Thus far, the Russians are supposed to have invested about $1,-500,000 in drilling south of the Danube and seem to be determined to develop this new producing region to the utmost.

It should be emphasized, however, that long before the Russian occupation, this area has been explored by the three main foreign companies and, subsequently, by the Germans. Further promising prospects are expected from the development of structures along the Steinberg, most of which were tested prior to 1944 by at least one wildcat.

Refining . . . Austrian refineries have a crude charging capacity of over 500,000 tons a year (10,000 bbl. per day).

A further 200,000 tons a year (4,000 bbl. per day) was damaged during the war or are now shut down. However, only 300,000 tons a year (6,000 bbl. per day) may be considered as modern (Lobau and Florisdorf).

The Lobau plant was finished after the war and is the only installation connected with Zistersdorf by pipe line. Cracking capacity amounts to less than 40,000 tons a year (800 bbl. per day). The refineries as well as the storage facilities are located around Vienna and are under Russian control.

A part of the Austrian crude is processed either in the Lutzkendorf plant in Eastern Germany, in Czechoslovakia and Romania, or is transported to the Russian refineries in Caucasus. This is unavoidable inasmuch as Austrian crude is heavy and viscous, and the local cracking capacity is completely insufficient.

Organization . . . The petroleum industry is run by the Russians through their specialized trusts, controlled by the Soviet Mineral Oil Administration and ultimately by Obiedinienie "Ucrneft" and Obiedinienie "Sojusneftexport."

The first trust controls what are considered to be the Soviet assets and interests abroad; the second handles disposition of the production and the profits.

As the Soviet aim is limited to lifting the greatest quantity of crude at lowest price, it is only too natural that this should be done to the detriment of conservation. Marketing is done exclusively by the Soviet concern, OROP.

Consumption . . . With the exception of some 40,000 tons (800 bbl. per day) of lubricants, the requirements of the Western Zones of Austria, totaling approximately 650,000 tons (13,000 bbl. per day) last year, of which half is fuel oil, have been covered by Russia. The export is compensated for by goods and shillings.

Despite the shortage of oil products in the Soviet orbit, there is no sign that the Russians intend to neglect or lose the Western Austrian outlet. Recent developments point to the contrary. When many Austrian industrial establishments planned to switch from residual fuel to coal a few months ago, in order to avoid unpleasant surprises from depending too closely on Russian supply, the Soviet administration guaranteed them a sufficient supply for the next 2 years.

The eastern zone's requirements are estimated at about 350,000 tons a year (7,000 bbl. daily), including oil used in refineries. Most of this is residual and fuel oil, and only a small fraction is gasoline and kerosine.

Hungary

The youngest and the least known in the satellite area is the Hungarian petroleum industry.

Hungary is divided into three regions. The three main fields are located in the Pannonian west of the Danube. They produce over an area 19 km. long and 1½ km. wide, known as the Lispe region. Its total reserves are estimated at 4,700,000 tons (35,500,000 bbl.) as of the end of 1951.

The three fields are: Budafapuszta, Lovaszy and Lendva-ujfalu, discovered in 1937, 1940 and 1941, respectively, by Maort (Standard Oil Co. [N. J.] affiliate). In 1942, a fourth field was discovered a few miles northeast of Lispe, at Hahot.

After the war, several holes were drilled north of Hahot on the Inke structure near the Yugoslav border, without any positive results. There are no other producing fields in the Pannonian region nor any other encouraging prospects.

In the northern region, called Feldfold (High Plain) the Hungarian Government drilled 52 holes and, in 1937, struck oil at Bukkszek. The deposit is noncommercial and the crude is very rich in asphalt. The present production might amount to 1 ton a day. There are no hopes for further discoveries in this area.

In the Alfold (Great Plain) east of the Danube, an area lying approximately between Mezokovesd, Debrecen, Batonia, and Szeged, was leased during the war to the German company Manat. After a thorough geophysical survey and the drilling of several wells, gas discoveries were reported at Karcag, Hajduszoboslo, Boszormeny, Puspokladany, Mezohegyes and Totkomlos, i.e., a chain of points surrounding this area.

The Russians in 1947 resumed drilling in this area and on the Bukkszek structure. According to confirmed reports, oil was discovered toward the end of 1948 near Nagyszalonta, Berekboszormeny, and Biharnagybajom. However, the quality of these deposits is of a nature to discourage, at least for the time being, their development. The same is true of the Banat structure in West Romania.

More recently, the Russians drilled unsuccessfully at Surd - Nemespátro, west of the Inke structure. Traces of oil have been reported south of Lake Balaton at Obornak, near Nagykanisza, as well as Godolo, near Budapest. Apparently, none of them is a commercial deposit, as no development has been undertaken. Therefore, there is no prospect, at least temporarily, that the declining trend of Hungarian oil production will be arrested.

Production . . . Since the ousting of the foreign corporations, among them Maort, which was opposing the government policy of quick depletion of the known reserves, the Lispe area has been exploited to the utmost.

The Three-Year Plan set a target of 660,000 tons (13,200 bbl. daily) for 1949, but only 505,000 tons (10,000

British Toast New Institute President

H. S. Gibson, center, is shown here in London following his election as 1952-53 president of the Institute of Petroleum. Gibson is managing director of Iraq Petroleum Co. and associated companies. He succeeds C. A. P. Southwell, left, managing director of Kuwait Oil Co. Left to right in the picture are Southwell, T. Dewhurst, Gibson, Prof. F. H. Garner, and Lt. Col. S. J. M. Auld.

bbl. daily) was produced. The following Five-Year Plan, started in January 1950, does not disclose any targets for petroleum.

In 1950 crude output amounted to 461,000 tons (9,220 bbl. daily) as compared with the peak output of 838,000 tons (16,760 bbl. daily) in 1943. At the end of the second quarter of 1951, the Government announced a "considerable lagging in crude-oil production." On December 15, 1951, an official spokesman said that "in no important industry was the increase as low as that of the oil production."

Nevertheless, the production of gasoline was reported to exceed the planned target. This may be due to the fact that a certain quantity of Austrian crude was processed in Hungary.

Refining . . . Charging capacity of the Hungarian refineries before the war amounted to almost 1,300,000 tons a year (26,000 bbl. daily). Most of them were located around Budapest.

A good half of this capacity was obsolete and an even higher proportion could be used mainly for separating mixtures of oil products imported at lower customs duties from Romania.

After 1945, the Russians dismantled installations from several plants, in particular from the largest one located at Szony.

At present, the theoretical charging capacity of the four larger plants in operation (Molaj at Szony, Shell at Csepel, Vacuum Oil at Almafuzito and Magyar Hydrobenzin at Petfurdo) is only 680,000 tons a year (13,600 bbl. daily). The Szony plant, the largest of all after restoration, is being run by the Soviet-Hungarian processing and marketing corporation Molaj R. T. Only the Shell plant has cracking installations.

To this capacity must be added the two former Maort gasoline plants located at Kerettye-Lovaszy. For present production there is an excess of plant capacity. No plans are known for modernizing or expanding present installations.

With the exception of the Vacuum plant, all are connected through an 8-in. pipe line with Lispe and Hahot fields. Since 1950, the line has been used 3 days a week for pumping gas to Budapest.

Since 1945 the entire surplus of oil products has been taken by Russia for war reparations. Smaller quantities have been sent to Czechoslovakia (and Yugoslavia, until beginning of 1949), under the same heading. Hungary has an agreement to export oil products to Poland but the quantity involved must be small.

Organization . . . Legally, the Hungarian oil industry is managed by two different organizations.

The mixed Soviet-Hungarian corporations, Maszovol and Molaj, are managing all petroleum activity, including marketing oil products in Hungary and abroad, with the exception of the foreign interests nationalized in September 1948. These consist of the Maort and Shell assets.

After repeated reorganizations, this sector is now divided into five trusts, four to deal with the sections of the Maort Co. and the last with the Shell refinery.

Refinery May be Enlarged

Further increases in capacity are already contemplated for the new refinery placed on stream last year by Soc. Industrielle Belge des Petroles at Antwerp, Belgium.

This was disclosed in the annual report of Petrofina, the Belgian company which shares ownership of the refinery with Anglo-Iranian Oil Co., Ltd. The report said the plant now is handling a throughput of 2,000,000 tons a year (about 40,000 bbl. daily) but that increases in demand have indicated the need for enlargement.

The refinery is scheduled to be officially dedicated by the Belgian Prime Minister June 23. It is located on a 375-acre site enclosed by a bend in the River Scheldt about 5 miles below Antwerp.

The Petrofina report said that Soc. Belge des Gaz de Petrole, which was organized last October by Petrofina and Anglo-Iranian, has already been able to enter into long-term contracts with large Belgian gas companies. Fina Petroleum Products, Ltd., has established new terminals in Britain and greatly increased its transport facilities in view of increased sales.

MIDDLE EAST

Oil Buyers Emerging

Reported offers by Argentine, U. S., Italian and other interests to buy from Iran laid to slumping tanker rates

Dahl M. Duff

THE current rash of attempts and reported attempts to lift oil from Iran is an expected consequence of the weakness in the tanker market.

It has been recognized all along in the industry that the high tanker charter rates which prevailed during the winter was one of the principal deterrents to any acceptance of the offers of Prime Minister Mossadegh's government to sell oil from the nationalized Anglo-Iranian Oil Co., Ltd., properties.

Since the spot tanker market has dropped from U.S.M.C. plus 200 per cent to the current U.S.M.C. flat or plus 15, various independent and unaffiliated interests apparently are seeing profit possibilities in attempting to move either crude or products out of Iran.

Argentine move . . . Last week reports circulated that the Argentines had arranged to take some 200,000 tons, or about 1,400,000 bbl., of fuel oil from Abadan. The report was given weight by the fact that the Argentines are known to need fuel oil.

The Argentine Government oil organization has a fleet of 26 tankers totaling 309,694 tons, including four new ocean-going vessels. The last of these, the Eva Peron, was launched only recently from a British shipyard and carried a cargo of Venezuelan fuel oil to Buenos Aires on her maiden voyage.

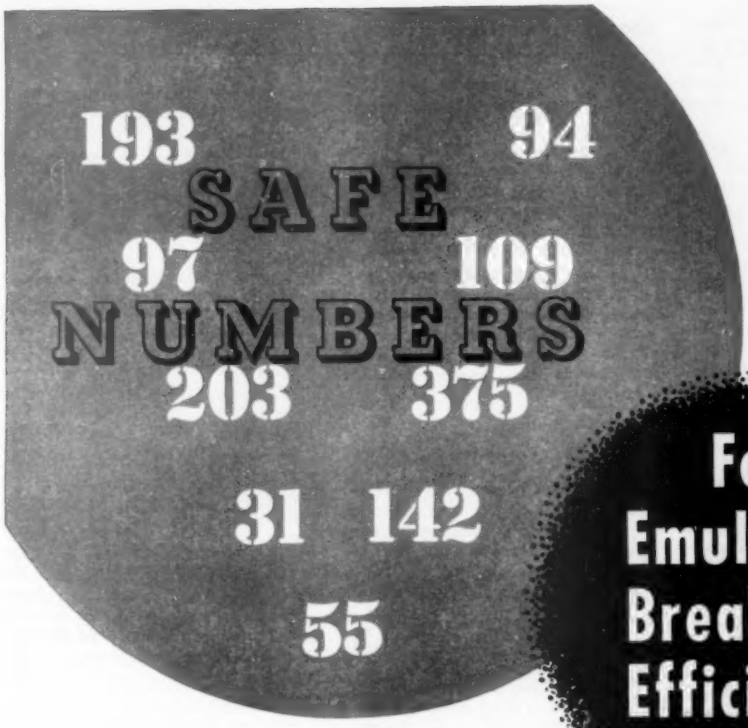
Two different tankers were reported either in or headed toward the Persian Gulf with plans to take oil from Iran.

One was the Italian ship, Rosamaria. This vessel was said to be headed for Bandar Mashur, a former Anglo-Iranian crude-loading port east of Abadan. It is understood that the ship put in at Kuwait.

What U. S. firm? . . . Industry circles were still speculating over the identity of the unnamed United States company which the Iranian Government in Teheran earlier announced had contracted to take 3,000,000 tons (about 65,000 bbl. daily) of Iranian oil over a period of 5 years.

Reports circulated in New York that the company involved was United States Waterways Corp., affiliated with one of the two largest Greek-owned shipping organizations.

This was flatly denied in London by Emanuel Kulukundis, a director of Waterways and Seatrade Corp. "I cannot understand why my name has been associated with this deal. I know noth-



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ing about it. My connection is entirely with the shipping business, and I have not had any dealings in oil." Kulukundis said he did not think tankers would be available for carrying Iranian oil anyhow.

Although there were other reports that the company in the Iranian deal was a small tanker firm with a similar name, industry circles took a skeptical view of the reported contract. For one thing, the quantity mentioned would require some 20 tankers a month, a fleet not available to any except the major international oil companies and the largest independent tanker organizations. None of the majors will move Iranian oil, and the larger tanker companies are unlikely to, if for no other reason than that such a move might react against their charter business with the oil industry.

More efforts coming . . . More of these sporadic and small-scale efforts to move oil out of Iran are anticipated as long as the tanker market remains weak and vessels are available. More than 12,000,000 bbl. of products are piled up at Abadan, and plenty of crude can be produced quickly. The steep decline in tanker rates makes it unnecessary for the Iranian Government to offer any price inducements.

The threat of legal action faces any company buying Iranian oil. Anglo-Iranian has indicated it will take court action against purchasers, presumably in the country of destination of the shipment. The company considers that it is still the rightful owner of the concession with the rights of production and marketing the oil.

One rumor on the Iranian situation which proved false originated in Italy. Count E. Carraffa d'Andria resigned as vice chairman and managing director of the Italian Government company, Azienda Generale Italiana Petroli, amid reports he had accepted the position of managing director of the National Iranian Oil Co. Subsequently the count arrived in London, flatly denied the reports, and said he had had no contact with Iranian officials since he had returned from a visit to Iran in July 1951.

He is still a member of Industria Raffinazione Olii Minerali and was in London for talks with officials of Anglo-Iranian, which jointly owns this refining company with AGIP.

In New Delhi, the Indian prime minister told the parliament that the Indian Government had not found it possible to buy oil from Iran. This, he said, was due to the fact that India lacked tankers, port installations, storage, and distribution facilities.

Socony Forms Turkish Firm

Socony-Vacuum Oil Co., Inc., has formed a new subsidiary in Turkey to handle its distribution and marketing operations in that country.

The company is Turkish Socony-Vacuum Co. Formerly Socony's operations in Turkey were handled by a branch of the parent organization. The new Turkish firm has taken over the various Socony marketing properties.

The charter of the company provides that it can engage in refining and exploration. However, Socony-Vacuum at present has formed no plans in this direction. Present Turkish law reserves these activities to the state organization.

Syrian Agreements Reached

The Syrian Government and Trans-Arabian Pipe Line Co. have settled on a revision of the company's transit agreement, the government has announced in Damascus.

Revenue to the government is more than doubled from about $450,000 to $1,100,000. The terms reportedly follow the same general pattern as the revised agreement negotiated earlier with Lebanon *(The Oil and Gas Journal, June 2, page 69)*.

Iraq Petroleum Co., Ltd., also is understood to have reached agreement with Syria. Both companies' pipe lines to the Mediterranean cross Syria and Lebanon. The last of the transit-agreement renegotiations is expected with Jordan which is crossed by Tapline's 30 and 31-in. line.

Iran Producing Some Crude

Crude-oil production in Iran during the first quarter of this year continued at a much-reduced rate due to the stoppage of export shipments.

Production during the quarter was:

	Long tons	Approx. equivalent in bbl. daily
January	124,002	30,500
February	132,474	35,000
March	110,513	27,300

This production by the National Iranian Oil Co. presumably represents withdrawals necessary to provide crude oil for refining at Abadan and Kermanshah to meet the needs of national consumption.

International Briefs

Israel has run into oil-supply difficulties as a result of the failure of Anglo-Israel financial talks in London. The government is preparing to issue emergency regulations for power cuts and to curtail motor-fuel consumption by rationing. Israeli foreign-office sources indicated the country now is seeking crude and products supplies from Russia.

A second well has shown production near Staffelden in the Haut-Rhin Department in France, according to reports from Paris. The well tested 2,600 liters (about 16½ bbl.) per hour before it was closed in to check for casing leaks. Production developed in this area is to be refined at Pechelbronn.

Refineria de Petroleo de Escombreras, in which California Texas Oil Co., Ltd., holds an interest, imported 350,000 tons (about 7,000 bbl. daily) of Arabian crudes during 1951, according to reports from Madrid. Refined products processed included 73,000 tons of gasoline, 86,000 tons of gas oil, 143,000 tons of fuel oil, and 17,000 tons of kerosine. The company is expanding capacity of the plant to reach a throughput of 1,500,000 tons annually (about 30,000 bbl. daily). This would be sufficient to cover about 80 per cent of domestic requirements.

Royal Dutch-Shell has brought the total number of tankers on order to its account in the Netherlands to 22 with the placing of contracts for seven more vessels aggregating 121,000 tons. The latest order includes three tankers of 18,000 tons each, three of 12,000 tons, and one of 31,000 tons. Total tonnage now booked for the company in the Netherlands amounts to about 400,000.

Dr. Rodrigo Noguera, attorney and part-time professor at the Universidad Javeriana, has been appointed minister of mines and petroleum in Colombia. He succeeds Manuel Carvajal, who resigned some time ago.

The final shutdown of operations at the Glen Davis shale-oil works near Sidney in Australia was scheduled for last week. The Australian Government made the decision to discontinue this government-backed, uneconomic operation last year. The Australian minister of supply in Canberra said that current operational losses amount to about A£6,000 ($13,400) a week.

Basrah Official

L. J. Teyssot began career as California roughneck

L. J. TEYSSOT, 52, general manager of Basrah Petroleum Co., is a Frenchman who began his storybook career in the California oil fields in the twenties.

Teyssot was graduated from an engineering school in Paris in 1921. Two years in military service followed. Then he worked on drilling rigs at Signal Hill, Huntington Beach, and Towrance fields in California.

The year 1925 found him in Boryslaw field in Poland. Next he became drilling superintendent in a Romanian field from 1927-29. Then he went to Venezuela to become assistant manager of a company which drilled a few exploratory well in the Mara, Urdaneta, and Mene Grande districts.

He returned to France in 1931 and was placed in charge of exploratory work for Syndicat d'Etudes et de Recherches Petrolieres en Tunisie. He worked at Ramadi and later transferred to Syria Petroleum Co. in Deir-ez-zor. The war finally caused drilling operations in that area to cease in May of 1941.

From 1941 to 1945 he was in military service, serving periods with General De Gaulle in London and Algiers.

He returned to Iraq Petroleum Co. after the war and was stationed at Gaza. In January 1948, while accompanying a drilling crew, he was wounded in a skirmish growing out of the movement to partition Palestine. He spent a year in exploration headquarters in Tripoli before being transferred to Basrah Petroleum Co. as field manager. He became general manager last January.

V. R. Lay, tool pusher for Wheless Drilling Co., has been transferred from Ruston to Shreveport, La.

Louis H. Weltman has resigned as district geologist for Lion Oil Co. at Corpus Christi, Tex., to open an office as an independent petroleum geologist.

R. S. McFarland, Dallas, has been elected executive vice president in charge of operations in the United States and Canada for Seaboard Oil Co. of Delaware. **J. P. Gasser,** vice president, will be his executive assistant. **Melbert Schwarz** has been named vice president and will succeed McFarland as manager of the company's Mid-Continent division. Other appointments include: **R. A. Stehr,** vice president to be coordinator of exploration; **N. A. Rousselot,** vice president; **A. W. Vitt,** Casper, Wyo., manager of operations in the Rocky Mountain area; **H. C. McCarver,** chief geophysicist; **R. G. Williams,** purchasing agent, and **C. J. Maki,** manager of gas operations.

F. G. Knight, of Ohio Oil Co., has been elected 1952-53 president of the Ark-La-Tex Geophysical Society. Other new officers are **B. B. Burroughs,** Sunray Oil Corp., vice president, and **L. C. Spencer,** consulting geophysicist, secretary-treasurer. All are of Shreveport.

L. E. FITTS, JR.

L. E. Fitts, Jr., has been named manager of exploration in the division office recently opened in Tulsa by Union Oil Co. of California. He formerly operated his own offices as a consultant. **Robert J. Lantz,** formerly associated with Woods Drilling Co. and the U. S. Geological Service, has been appointed geologist in the office.

William C. Norman has resigned as president of Northeastern Gas Transmission Co. and as vice president of Tennessee Gas Transmission Co., effective July 1, to become a general partner of Lambert & Co., capital investment firm in New York. He will continue as a director of Northeastern.

J. J. Jourdan, toolpusher formerly with Standard Fryer Drilling Co. at Midland, Tex., is now with Fryer & Hansen Oil Co. at Renovo, Pa.

G. P. Crombie has been promoted to chief geologist for Texaco Exploration Co. at Calgary, Alta. Before joining the company in 1948 he was with the Department of Mines and Resources (Geological Survey) at Ottawa.

G. S. Patterson has been elected president of Buckeye Pipe Line Co., succeeding **J. H. Peper,** who was named chairman of the board. Patterson joined Buckeye in 1940 as assistant to the president and became executive vice president in 1948. **W. E. Jennings,** who began his oil career 44 years ago with the United Pipe Line division of Standard Oil Co., was named executive vice president of Buckeye.

G. S. PATTERSON

W. E. JENNINGS

B. A. Hardey, Shreveport independent, has been appointed Louisiana conservation commissioner by Gov. Robert Kennon to succeed **S. L. Digby,** effective upon the expiration of Digby's term December 10. Digby has been commissioner since 1948. Hardey, a former president of the Independent Petroleum Association of America, is a director of the I.P.A.A., the American Petroleum Institute, the Independent Natural Gas Association of America, and the Mid-Continent Oil and Gas Association.

W. R. Donnell and **W. D. Berger, Jr.,** have organized Donnell & Berger, a new geological consulting firm at Midland, Tex. Donnell formerly was associated with Magnolia Petroleum Co., Anderson-Prichard Oil Corp., and Oliver & Kotyza. Berger was a geologist for Humble Oil & Refining Co. in Florida and Alabama.

Wilhelm Terschak, engineer for Wintershall-Ag-Erdolwerke at Nienhagen, Germany, is inspecting United States oil operations. He has visited Los An-

PERSONALS

geles, Bartlesville, and Tulsa areas. At The Oil and Gas Journal office last week he assembled a number of technical reports and engineering manuals for his company's use. Terschak will visit Bradford, Pa., water-flood operations before returning to Germany.

J. B. GODWIN

J. E. PERKINS

J. B. Godwin, process superintendent in the Beaumont refinery of Magnolia Petroleum Co., will be transferred temporarily to Coryton, England, as superintendent of the new 20,000-bbl. refinery being built by Vacuum Oil Co., Ltd., in partnership with the Powell Duffryn industrial interests. Others to be transferred temporarily from Beaumont to Coryton are: **H. T. Fuller, Jr.,** who will be Coryton assistant refinery superintendent; **Harold Ezell,** assistant foreman of the Beaumont lube plant, who will be operating foreman for lubricating oils; and **J. E. Perkins,** who will be operating foreman for petroleum light ends. Godwin and Fuller will leave the last of June and Ezell and Perkins plan to leave in August.

Fred H. Moore, assistant to the president, has been named manager of Magnolia Petroleum Co.'s crude-oil purchases and sales department succeeding the late Geddes Noble. Moore joined Magnolia as field geologist in Oklahoma in May 1935. **D. R. Wall, Jr.,** has been made assistant manager of the department.

Donald H. Bancroft has been transferred from Creole Petroleum Corp. in Venezuela to Colombia as chief of production for International Petroleum (Colombia), Ltd.

David Graham and **John E. Swearingen** have been elected directors of Standard Oil Co. (Ind.). Graham joined Standard as financial vice president in January. Swearingen, who joined Standard in 1939 as a chemical engineer in Whiting, is general manager of production and at 33 is the youngest executive ever elected to the board.

Carroll E. Dobbin, Geological Survey geologist specializing in the geology of western petroleum, natural gas, and coal, has received the honorary degree of doctor of engineering from the Colorado School of Mines.

Paul G. Blazer, chairman of the board of Ashland Oil & Refining Co., received an honorary doctor of laws degree at the University of Kentucky's annual commencement exercises in Lexington.

Paul H. Smith, formerly an estimator for Refinery Engineering Co. at Tulsa, is now a construction project manager for the company at Corpus Christi, Tex.

R. M. Brackbrill, formerly district superintendent for Shell Oil Co. at Calgary, Alta., has been transferred to Houston as an exploitation engineer with the technical-services group of Shell.

Clovis E. Rodelander, formerly a petroleum engineer for Stanolind Oil & Gas Co. at Abilene, Tex., has been appointed district manager for Grove Regulator Co. at Odessa, Tex.

Harold S. Skinner has been promoted to the newly created post of assistant general manager for Continental Oil Co. in the central region with headquarters in Oklahoma City. For the past year he has been regional general attorney there.

T. O. Banta has been appointed gas-measurement engineer for United Gas Pipe Line Co. at Shreveport, La. He formerly was district gas-measurement superintendent at Wichita Falls, Tex.

R. E. Neilson, Jr., has been promoted by Shell Oil Co. from mechanical engineer in the technical services department to exploitation engineer in the production department at Houston.

Luther F. Bryant, paleontologist and geologist for Amerada Petroleum Corp. at Houston, has been transferred to Tyler, Tex.

R. T. Henderson, chief safety engineer for Standard Oil Co. (Ohio) at Cleveland, will retire July 1 after 37 years of service.

H. D. Campbell, vice president in charge of production for Franco Western Oil Co. at Bakersfield, Calif., the past 3½ years, has been elected president and general manager. He is a petroleum-engineering graduate of the Colorado School of Mines.

L. B. Spencer, formerly employed in West Edmond field, Oklahoma, by Sohio Petroleum Co., is now a production engineer for Seaboard Oil Co. of Delaware in Ardmore, Okla.

T. L. Huddleston has been transferred and promoted from assistant district production engineer for Lone Star Gas Co. at Athens, Tex., to district production engineer at Snyder, Tex.

T. J. Prehoda, drilling superintendent, and **H. N. Stanier,** development engineer, for Sunray Oil Corp. at Newhall, Calif., are stationed temporarily in Canada with Pacific Petroleums, Ltd.

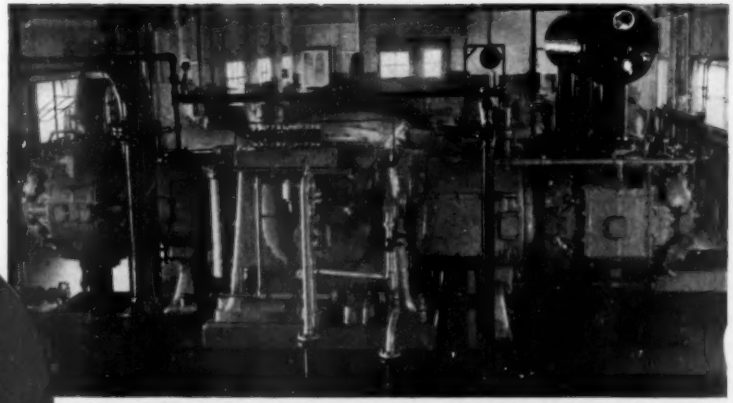
M. T. STEVENS

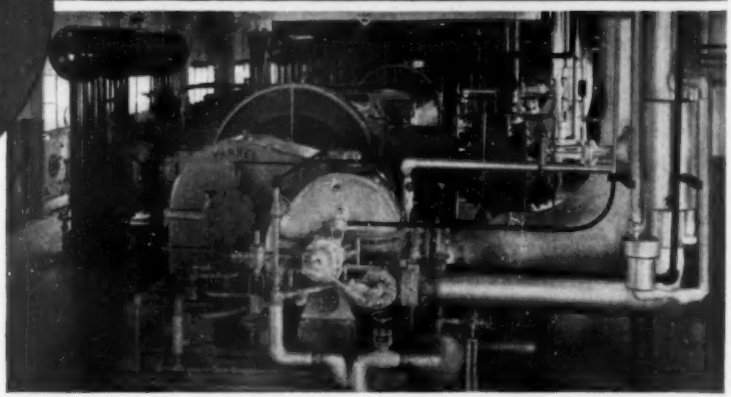
M. T. Stevens, who formerly managed refineries at Moose Jaw, Calgary, and Edmonton for British American Oil Co., Ltd., has been appointed manager of the company refinery in Clarkson, Ont. **C. W. Coote,** for the past 4 years assistant manager of the Calgary refinery, has been named manager there. **R. M. Donald,** formerly superintendent of the Turner Valley absorption plant, has been appointed assistant manager at Calgary. **R. T. Watson,** former manager of the Calgary refinery, has been named manager of the Edmonton refinery.

C. W. COOTE

R. T. WATSON

G. Curtis Mayes, mechanical engineer for Magnolia Petroleum Co. in field-research laboratories in Dallas, has been appointed a senior petroleum engineer in the mechanical-equipment section of the petroleum-engineering department. **G. W. Walker,** petroleum engineer, has been transferred from Falfurrias, Tex., to the Lake Charles, La.,





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BETHLEHEM *Sucker Rods*

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PERSONALS

Old and New Officers of Houston Society

These incoming and outgoing officials of the Houston section of the Society of Exploration Geophysicists were photographed during the section's recent meeting. Left to right are, front row, Joseph E. Shimek, Geophysical Associates, new president; T. O. Hall, General Geophysical Co., new second vice president; J. E. (Sam) McGee, Gulf Research & Development Co., new first vice president; and Earle W. Johnson, General Geophysical Co., outgoing president. Back row: C. R. Wallace, The Texas Co., outgoing secretary; Eugene Frowe, Robert H. Ray Co., outgoing first vice president; and W. E. Steele, Jr., consultant, incoming secretary. Keith R. Beeman, Southwestern Industrial Electronics Co., new treasurer, was not present when the picture was taken.

producing district. **James W. Tucker, Jr.,** petroleum engineer, has been transferred from the Lake Charles to the Falfurrias district. **M. H. Beaver,** petroleum engineer, has been transferred from the Luling to the Falfurrias district.

Lloyd G. Smith, vice president of Creole Petroleum Corp. in the company's New York office, was reelected president of the Venezuelan Chamber of Commerce of the United States at the sixteenth annual meeting in New York. **Robert L. Boggs,** in charge of Western Hemisphere operations in the foreign production department of Gulf Oil Corp., was named a director of the chamber.

V. W. Hart has been transferred from Alice, Tex., where he was a district superintendent for Bridwell Oil Co., to Archer City, Tex., as production superintendent.

Edward C. Myers, Jr., formerly production superintendent for Anschutz Drilling Co. at Great Bend, Kans., has been appointed manager of the Rocky Mountain region for O'Neill Tank Co. at Casper, Wyo.

John H. Wilson, independent operator, has been elected president of the Fort Worth Geophysical Society. Other officers are **E. J. Gemmill,** Cities Service Oil Co., vice president, and **T. L. Kundel,** The Texas Co., secretary-treasurer.

J. M. Kirby, geologist formerly with Richmond Petroleum Co. of California in San Francisco, has moved to New York where he is supervisory geologist for American Overseas Petroleum, Ltd., the new Eastern Hemisphere exploration affiliate of Standard Oil Co. of California and The Texas Co.

R. H. DOTT

Robert H. Dott, director of the Oklahoma Geological Survey at Norman since 1935, has been appointed executive director of the American Association of Petroleum Geologists, effective July 1. **John W. Clark,** assistant chief geologist for Magnolia Petroleum Co. at Dallas, has been appointed to serve out Dott's unexpired term as secretary-treasurer of the A.A.P.G.

J. W. Harp., geologist for Sun Oil Co., has been transferred from Midland, Tex., to Dallas.

William B. Belknap, production engineer for Phillips Petroleum Co. at Ardmore, Okla., has been transferred to Wichita Falls, Tex.

L. E. Harrington and **John R. Lynn,** independent consulting geologists of Billings, Mont., are representing Oceanic Oil Co. in that area.

M. Scott Kraemer has been transferred and promoted from petroleum engineer at Houston to senior petroleum engineer at Tulsa by Stanolind Oil & Gas Co.

John S. Patchin, superintendent of the mechanical department in the Philadelphia refinery of Atlantic Refining Co., has been named assistant refinery manager.

Maxie W. Freeman has resigned as production engineer for Skelly Oil Co. at Carthage, Tex., to join The Texas Co. at Harvey, La., as petroleum engineer.

Clint Leuth, formerly district geologist for American Republics Corp., at Houston, has been appointed district geologist in the company's new office in Billings, Mont. **C. M. Reed** has replaced Leuth at Houston.

DEATHS

Harry R. Standiford, 65, an engineering designer of refineries and power plants, died June 1 in New York.

Dr. Luciano Claude, technical advisor for Corporacion de Fomento, died May 26 in Santiago, Chile, following a brief illness. He had made several trips to the United States as an official of the government oil division.

James J. Price, 53, Tulsa, lease broker, died in San Antonio, Tex., June 2.

W. Geddes Noble, 54, manager of the crude-oil purchases and sales department of Magnolia Petroleum Co., and a director of Magnolia Pipe Line Co., died May 30 at his home in Dallas. He had been with Magnolia Since 1915.

Jessel S. Whyte, 61, president and general manager of Macwhyte Co., manufacturer of wire rope, died May 28 in Kenosha, Wis.

Walter Miller McGee, 92, formerly vice president and a director of Socony-Vacuum Oil Co., Inc., died May 30 at North Plainfield, N. J. He began his career as an associate of his father, the late James A. McGee.

Alfred Peter Groebl, 50, who had oil and gas holdings in West Texas and New Mexico, died May 28 in a San Angelo, Tex., hospital.

Extractive Distillation of High-Purity Aromatics . . .

. . . a discussion of the application of Shell Oil Co.'s new process for the production of nitration-grade aromatics, and how the problem of maintaining product purity is met.

by C. L. Dunn* and G. E. Liedholm*

THE quantity production of nitration-grade aromatics from petroleum sources during and since World War II assumes special significance when one considers the high purity which "nitration grade" implies. Production of benzene and toluene involves the separation of essentially a chemically pure substance from sources which at times contain only a few per cent of the aromatic admixed with a wide range of other hydrocarbons, some of which exhibit the same volatility as the aromatic.

High-purity, or nitration-grade, aromatics are most commonly produced to conform to the A.S.T.M. specifications summarized in Table 1. A detailed examination of a few of the most pertinent specification tests is necessary in order to obtain a clear idea of the problems involved in producing aromatics which conform to them.

The distillation range of 1.0° C., initial to dry, specified for benzene and toluene must be considered in the light of the fact that 99.9+ per cent benzene or toluene has a range of 0.4° C. according to the standard procedure and that, with less-pure samples, the observed initial points and dry points are not reproducible to better than ±0.1° C. Thus the safe tolerance for impurities is considerably less than one might at first surmise.

The extent to which the distillation curve for 99.9 per cent benzene, or toluene, is shifted by the addition of a few known impurities is shown in Fig. 1. Thus the presence of only 0.1 per cent of the next higher aromatic is alone sufficient to bring the boiling range to the specification limit. About 1 per cent of a naphthene such as methylcyclohexane in benzene can just be tolerated, whereas saturation with water will cause the maximum boiling-range specification to be exceeded. The initial boiling point of benzene may be lowered as much as 2.3° C. by the amount of water corresponding to saturation at room temperature.

The acid-wash test is perhaps the most sensitive of the specification tests; it detects small traces of certain types of unsaturated hydrocarbons. For example, as little of 0.002 per cent cyclopentadiene, 0.01 per cent methylpentadiene, or 0.1 per cent cyclohexane can be tolerated for an acid-wash color specification of 2 (Table 2). It is particularly significant that these types of compounds are the most difficult hydrocarbons to separate from the aromatics by the more common physical separation techniques; e.g., adsorption, extraction, and extractive distillation.

A maximum of 1.0 per cent impurity is allowed in benzene by the freezing point specification of 5.0° C. minimum (Fig. 2). In the case of toluene, the A.S.T.M. specification for saturates allows 1.5 per cent maximum, whereas the U. S. Army specification allows only 1.0 per cent.

In summary, one finds that, in order to meet all specifications for nitration-grade benzene or toluene, the product must certainly be of 99.0 per cent purity, with less than 0.1 per cent of a second aromatic constituent. To allow for slight variations in feed compositions and plant control, a commercial plant must be designed for 99.5 per cent purity.

The Process

The requirement of high purity, when coupled with the stipulation of

*Shell Development Co., Emeryville, Calif. Summary of the paper "Shell Extractive Distillation Process for Recovery of High-Purity Aromatics," presented at A.P.I. midyear meeting, San Francisco, May 1952.

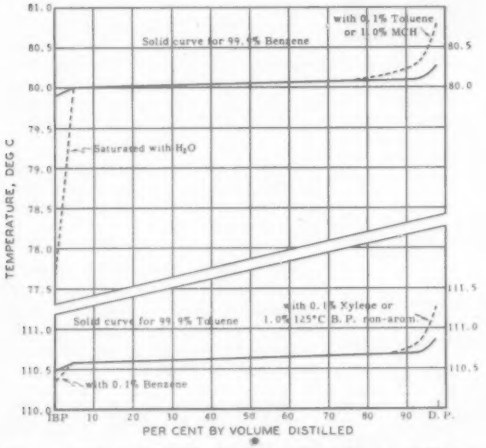

Solid curve for 99.9% Benzene
with 0.1% Toluene or 1.0% MCH
Saturated with H_2O
Solid curve for 99.9% Toluene
with 0.1% Xylene or 1.0% 125°C B.P. non-arom
with 0.1% Benzene
TEMPERATURE, DEG C
PER CENT BY VOLUME DISTILLED
IBP
D.P.

Fig. 1 — Shift in A.S.T.M. distillation curves due to addition of impurities.

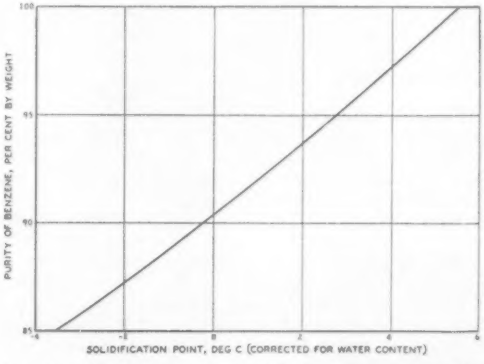


Fig. 2—Purity of benzene vs. solidification point (assumes MW of impurity = 98).

TABLE 1—SPECIFICATIONS FOR NITRATION-GRADE AROMATICS

A.S.T.M. designation—	Benzene D-835-50	Toluene D-841-50	Xylene D-843-50
Specific gravity, 15.56/15.56	0.8820 to 0.8860	0.8690 to 0.8730	0.8650 to 0.8700
Distillation range: initial to dry, °C.	1.0, including 80.1	1.0, including 110.6 ± 0.1	3.0, including 139.3‡
Solidification point, °C.	4.85*		
Saturates, per cent by weight (maximum)		1.5 per cent†	4.0 per cent
Acid-wash color (maximum)	2	2	6
Acidity	None	Same	Same
Sulfur	No H_2S or SO_2	Same	Same
Copper corrosion	No coloration	Same	Same
Color	Not darker than 3 p.p.m. $K_2Cr_2O_7$ in H_2O	Same	Same

*Barrett Division, Allied Chemical & Dye Corp., and others specify a minimum of 5.0° C. †U. S. Army specifies 1.0 per cent by volume. ‡Minimum initial boiling point, 137.2° C.; maximum dry point, 140.5° C.

TABLE 2—UNSATURATES CONTENT IN BENZENE FOR ACID-WASH COLOR 2

	Per cent by volume
Cyclopentadiene (dicyclopentadiene)	0.002
2-Methyl-1, 3-pentadiene	0.01
Cyclohexene	0.1
2,4,4-Trimethyl-2-pentene	2.0
1-Heptene	3.0

high recovery from dilute sources, places a premium on process control. The purity requirement imposes a necessity for long periods of onstream operation, as little opportunity exists for blending off-specification products. The Shell extractive distillation process was developed with these factors in mind.

The process consists of three steps: (1) prefractionation of the petroleum stock in one or two columns to prepare a concentrate fraction which contains a single aromatic (benzene, toluene, xylenes, etc.); (2) distillation of the fraction in the presence of a higher-boiling solvent such as phenol, followed by stripping of the aromatic from the solvent; and (3) a mild treating step, usually required only in order to pass the stringent acid-wash color test.

Fig. 3 is a simplified flow diagram of a plant to recover a single aromatic such as benzene from catalytic reformate. Depentanized naphtha—for example, from a Platforming unit—is charged to the prefractionation column (usually 65 trays) to reject those constituents which cannot be separated efficiently from the aromatic in the extractive distillation step. The exact conditions to be chosen depend upon the feed stock—keeping in mind that a proper balance of load should be maintained between this and the extractive step.

The aromatic concentrate is charged at a midpoint in the extraction column (60 to 70 trays), and hydrocarbon-free solvent is introduced a number of plates above. The upper section above the solvent port is provided to "knock back" solvent so that essentially aromatic-free and solvent-free raffinate is removed as top product. The lower section of the column serves to recover the aromatic, which is separated from the solvent in the subsequent stripping column (30 trays).

A small solvent cleanup still (single-stage) is provided to reject continuously very small amounts of high-boiling reaction products of phenol and diolefins, as well as phenol and iron which otherwise would accumulate in the circulating solvent. The effect is minor when oxygen is excluded from the system by gas-blanketing accumulators and rundown tanks which handle streams which reach the extraction system. Phenol reaction products amount to less than 1 bbl. per week in a plant which recovers 1,000 bbl. per day of aromatic from dehydrogenation product.

It has been found by experience that corrosion of carbon steel by phenol at temperatures below 170° C. is negligible. All equipment in phenol service—including lines, columns, traps, and bubble caps—can be of carbon steel except the valve trim and the reboiler tubes and tube sheets in the extraction and stripping columns, which are normally fabricated of Type 316 stainless steel. The two hot solvent pumps are constructed of a special Fe-Cr-Ni alloy (e.g., Worthite). Tables 3 and 4 list corrosion rates for common metals in hot phenol service.*

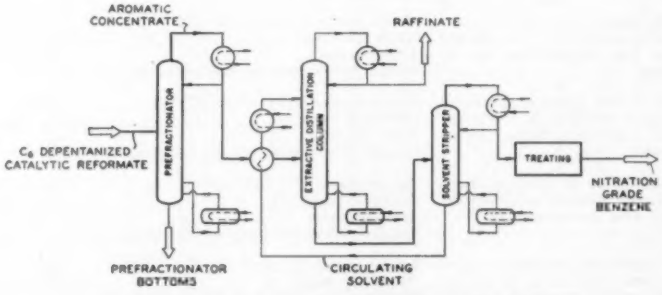


Fig. 3—Shell aromatics recovery process—nitration-grade benzene.

TABLE 3—EFFECT OF TEMPERATURE ON CORROSION OF STEEL BY PHENOL*

Temperature (°C.)	Corrosion rate (mils per year)
175	1
260	16
310	30
340	46

*Conditions: Polished low-carbon steel strip, 0.25 by 2 in.; immersed to 10 g. of phenol dehydrated by distillation, in evacuated and sealed glass tube; stagnant for 24 hours.

TABLE 4—CORROSION OF DIFFERENT ALLOYS OF PHENOL*

Alloy—	Corrosion rate from weight loss (mils per year) Pure phenol	Used plant phenol
1. Low-carbon steel (0.06 per cent carbon)	30	43
2. 12-chromium steel (Type 416)	24	10
3. 18-8 stainless steel (Type 304)	0	0
4. 18-8 and molybdenum stainless steel (Type 316)	0	1
5. Durimet stainless steel (cast)	1	0
6. 24-20 stainless steel (Type 310)	1	0
7. Nickel (99.4 per cent)	0	31
8. Aluminum 2-S	2,200	

*Conditions: Polished metal strip, 0.25 by 2 in.; immersed in 10 g. of phenol; sample dehydrated by distillation, in evacuated and sealed glass tube; stagnant for 24 hours.

Table 5 is a material balance for recovery of benzene from a depentanized catalytic reformate which contains 46 per cent benzene. The recov-

*A. Wachter and N. Stillman, Trans. Electrochem. Soc. 87, 183 (1945).

TABLE 5—MATERIAL BALANCE (SOLVENT-FREE BASIS)
(Nitration-grade benzene from dependanized catalytically reformed C_6 naphtha)

	Feed		Top product		Bottom product	
	Bbl. per stream day	Per cent by volume of benzene	Bbl. per stream day	Per cent by volume of benzene	Bbl. per stream day	Per cent by volume of benzene
Benzene concentration	2,214	45.9	2,004	50.5	210	2.0
Extractive distillation	2,004	50.5	994	1.0	1,010	99.2
Solvent stripping	1,010	99.2	1,010	99.2	Solvent	
Redistillation*	1,010	99.2	1,000	99.5	10	

*After acid treatment and caustic wash. Note: Recovery of nitration-grade benzene = 98.4 per cent.

TABLE 6—LABOR, CHEMICAL, AND UTILITY REQUIREMENTS*

	Per barrel of benzene
Chemicals:	
Phenol, lb.	0.2
98 per cent sulfuric acid, lb.	3
Caustic, lb.	Less than 1
Utilities:	
Fuel, millions of B.t.u.'s	1.1
Circulating cooling water (90° to 120° F.), gal.	3,100
Eelctric power, kw.-hr.	3.3
Operating labor (direct cost), cents	14
Maintenance labor and materials, cents	10

*For nitration-grade benzene from dependanized catalytically reformed C_6 naphtha (1,000 bbl. per stream day of benzene).

ery of nitration-grade benzene is 98.4 per cent. Utility and chemical requirements are listed in Table 6.

Why It Works

Extractive distillation depends upon the enhancement of vapor pressures in nonideal solutions. When a dissimilar third component is added to a relatively narrow-boiling mixture of two different kinds of components, the vapor pressure of one is increased relative to that of the other, thus permitting separation by distillation.

The effectiveness of phenol in aiding the separation of aromatics from close-boiling nonaromatics is illustrated by the data in Table 7. From these data it is apparent that, if one is careful to exclude the bulk of the higher-boiling nonaromatics in the prefractionation step, the close-boiling paraffins, naphthenes, and olefins, including cycloolefins, can be rejected to the overhead raffinate. This has been illustrated in a practical manner by the successful application of the process during the war for the recovery of toluene from: (1) straightrun naphthas; (2) the product from naphthene dehydrogenation at 750 psig. over tungsten-nickel-sulfide catalyst; (3) hydroformates; (4) thermally reformed and cracked fractions; and (5) cracked gasolines from the true vapor-phase process. A mild pretreatment with sulfuric acid or clay in case (4), and with phosphoric acid in case (5), is desirable to remove part of the diolefins.

The requirement for prefractionation becomes more and more important as olefinicity increases for progressive increase in the number of double bonds makes the molecule behave more and more like an aromatic in degree of departure from ideality. This complication holds for all the common physical separation processes, viz.: adsorption, extraction, and extractive distillation.

The relative volatilities given in Table 7 shows that a relatively large number of stages is required to attain high purity and high recovery. However, the excellent efficiency and capacity of vapor-liquid contacting devices make it possible to achieve these ends at reasonably low cost.

Treating

The type and severity of treatment to be given the aromatic recovered by extractive distillation depend upon the source material (Table 8). It is interesting that benzene recovered from natural gasoline requires only caustic and water wash to remove small traces of

(Continued on page 96)

TABLE 7—RELATIVE VOLATILITIES* FOR 50-50 MOLAL MIXTURES OF EACH HYDROCARBON WITH BENZENE AT 120° C.

Component—	Normal boiling point (°C.)	Volatility relative to benzene: Solvent-free	Volatility relative to benzene: With 50 mol per cent phenol
n-Hexane	68.74	1.28	2.33
3-Methylhexane	91.95	0.72	1.37
n-Heptane	98.43	0.62	1.17
Cyclohexane	80.74	0.97	1.59
Trans.-1,3-dimethylcyclopentane	92.34	0.77	1.32
Methylcyclohexane	100.93	0.60	1.00
l-Hexene	63.49	1.53	2.2
Cyclohexene	82.98	0.92	1.3

*Relative to benzene.

TABLE 8—TREATING REQUIREMENTS

Nitration-grade aromatic	Source	Treating requirements	Properties	
Benzene	Natural gasoline	Caustic and water wash (redistillation not required)	Specific gravity (15.56°/15.56° C.)	0.8842
			Distillation range, °C.	79.8 to 80.6
			Solidifying point, °C.	5.25
			Acid-wash color	0.5
Toluene	Naphthene dehydrogenation	0.01 lb. maleic anhydride per barrel of toluene, followed by caustic and water wash (redistillation not required)	Specific gravity (15.56°/15.56° C.)	0.8702
			Distillation range, °C.	110.6 to 111.2
			Acid-wash color	1.5
			Paraffin hydrocarbon, per cent by volume	0.5
Xylenes	Naphthene dehydrogenation	0.07 lb. maleic anhydride per barrel of xylene, followed by caustic and water wash (redistillation not required)	Specific gravity (15.56°/15.56° C.)	0.8686
			Distillation range, °C.	138.8 to 140.5
			Acid-wash color	2.5
			Paraffin hydrocarbons, per cent by volume	1.0
Toluene	Hydroforming	4 lb. H_2SO_4 (98 per cent) per barrel of toluene, followed by caustic and water wash and redistillation	Specific gravity (15.56°/15.56° C.)	0.8719
			Distillation range, °C.	110.4 to 110.8
			Acid-wash color	1
			Paraffin hydrocarbons, per cent by volume	0.4
Toluene	Thermally crkd. naphtha	20 lb. H_2SO_4 (98 per cent) per barrel of toluene, followed by caustic and water wash and redistillation	Specific gravity (15.56°/15.56° C.)	0.8713
			Distillation range, °C.	110.3 to 110.7
			Acid-wash color	2
			Paraffin hydrocarbons, per cent by volume	0.8

How to Combat Circulation Loss

The problem of lost circulation is very important to drillers. Methods of preventing this situation, or failing that, methods of rapid detection and restoration are of utmost importance. The author and a number of his colleagues have made analyses of the ways in which lost circulation occurs. From these findings and subsequent tests based on them, several methods are suggested to alleviate this problem.

by W. C. Goins, Jr.*

THE lost-circulation problem has been intensively studied by Gulf Oil Corp. personnel during the past 2½ years, and while this type of drilling difficulty is by no means completely solved, considerable useful knowledge has been developed.

How Lost Circulation Occurs

The most significant new development has been an increased knowledge of how lost circulation occurs. Whereas it was formerly believed that losses occurred when a permeable zone was penetrated, the evidence collected indicates that this is only rarely true in Gulf Coast drilling. However, losses to permeable zones do occur on occasion in this area, and to make consideration of the problem complete this type of loss should be examined.

Highly permeable sands and gravels . . . While it is generally believed that mud cannot penetrate formations with a permeability of less than 100 darcies which excludes most consolidated sands and gravels, some unconsolidated and highly permeable formations are penetrated and take fluid. These are often relatively shallow and easy to seal through the use of bentonitic clays and common sealing materials.

Cavernous formations . . . When cavernous formations are penetrated the loss of circulation is usually sudden and complete. The bit may actually drop from a few inches to several feet and the fluid level usually falls. If small channels are present common sealing materials may seal the zone, but great difficulty may be met in sealing the larger openings. The most successful means of sealing this type of loss has been to spot cement from a point above the loss zone so that it will not all flow into the zone before setting. This practice leaves what may be pictured as a cement "liner" when the cement is drilled out.

This type of loss is usually found in drilling limestone and dolomite, although it may occur in drilling the cap rock of salt domes in the Gulf Coast area.

Natural fractures . . . It appears that most of the natural fractures on the Gulf Coast are closed by compaction and/or cementation and consequently mud is not readily lost to them unless hole pressures are great enough to part the fracture planes. In very hard consolidated formations the fractures are undoubtedly open and may take mud at the time they are penetrated. The Spraberry formation of West Texas gives much lost-circulation difficulty of this type, but it seems that few losses occur in the Gulf Coast as a result of drilling into open natural fractures.

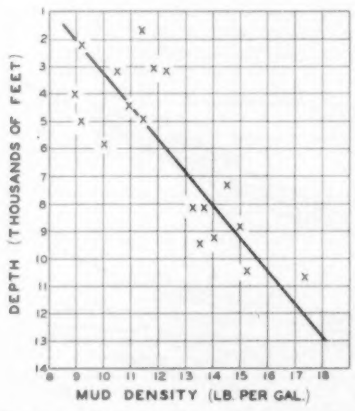
Induced fractures . . . These are the result of fluid pressures exceeding the strength of the formation, causing it to part and take fluid. These fractures may be new, or the result of pressures opening natural fractures that have been closed by compaction and cementation. This type of loss appears to be the one with which we principally have to contend in Gulf Coast drilling.

Evidence of Induced Fracturing

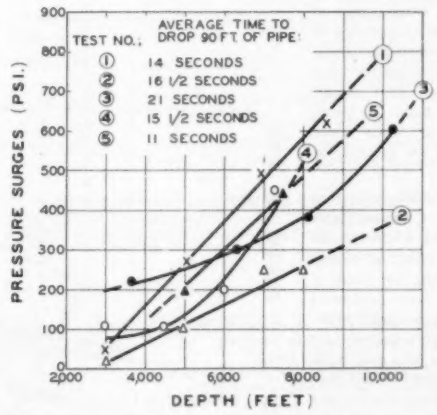
The conclusion as to the predominance of induced fractures in Gulf Coast loss of circulation is not self-supporting, and therefore the evidence upon which it is based should be examined.

Formation strength . . . Recent publications dealing with Hydrafrac,[1,2,3] squeeze cementing, acidizing, and fracturing in water-injection wells report that pressure gradients as low as 0.55 to 0.60 psi. per foot of depth are sufficient to fracture some wells. Howard and Scott[4] report that a review of the records of 276 intentionally fractured wells showed that pressure gradients of 0.65 to 1.14 psi. per foot of depth were sufficient to cause fracturing. Converting the gradient of 0.55 to mud density shows that 10.5-lb. per gallon muds provide enough pressure to part some formations. Data given later in this paper would indicate pressure parting in some instances with muds having a density as low as 9.0 lb. per gallon, but it is suspected that part of the fracturing

*Houston chemical laboratory, Gulf Oil Corp. Paper presented at supervisors' conference, Gulf Oil Corp., Galveston, Tex.



MUD DENSITY and points of loss in a number of Gulf Coast wells (Fig. 1).



PRESSURE SURGES (1) due to running rapidly one stand of drill pipe (Fig. 2).

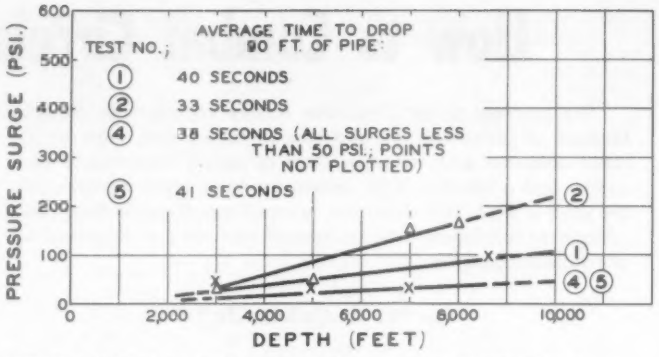
pressure was contributed from sources other than mud density. All of this then would indicate that fractures may be induced with mud densities in common use.

Position of losses in hole . . . If open fractures or channels are the cause of loss then it would be expected that circulation would be lost as these are penetrated. Table 1 shows the results of 26 successful Spinner surveys made on Gulf wells in the Gulf Coast district to locate the point of loss of circulation. In none of these was the point of loss at the bottom of the hole. In one instance the loss point was located at a level at which the well was drilling when it had previously lost circulation, and it was reasoned that the loss at that time may have been on bottom. These losses were found at points which varied from 13 to 7,238 ft. off bottom at the time of loss, clearly showing that the zones did not break down at the time of penetration by the bit, but the losses were caused by pressures imposed during later drilling. This excludes one loss around the casing seat which occurred as the shoe was drilled out.

Variation of formation strength with depth . . . Fig. 1 is a plot of some of the data from Table 1 and shows the mud density used and the depth of the point of loss for the listed wells. It indicates that the shallow formations tend to break down at lower mud densities than do the deeper ones. Since shallow zones are more readily broken down, this explains why losses occur off bottom. This feature does not tend to eliminate difficulties in deep drilling, however, as the mud-density requirements also increase with depth.

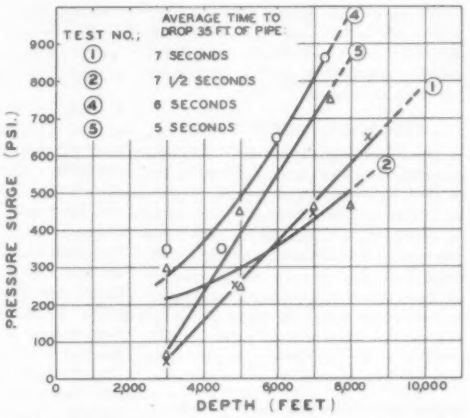
Sources of pressures that cause formation breakdown . . . Undoubtedly many losses occur in shallow, weak zones at the time mud densities are increased to take care of deep high-pressure zones. However, this does not account for even a majority of the losses that occur, and other explanations must be found for the many losses that occur when the well is drilling and no increase is made in mud density.

Observations by the study group in Peach Point and Little Chenier fields showed that of a total of 45 losses, 25 were directly following either spudding the pipe while circulating or running pipe in the hole. In two instances complete circulation was possible before a trip but there was a partial loss of circulation when pipe was run back to bottom. These data led to the conclusion that surge pressures due to the "piston-like effect" of downward pipe movements, when added to hydrostatic pressures, were causing the formation to part.

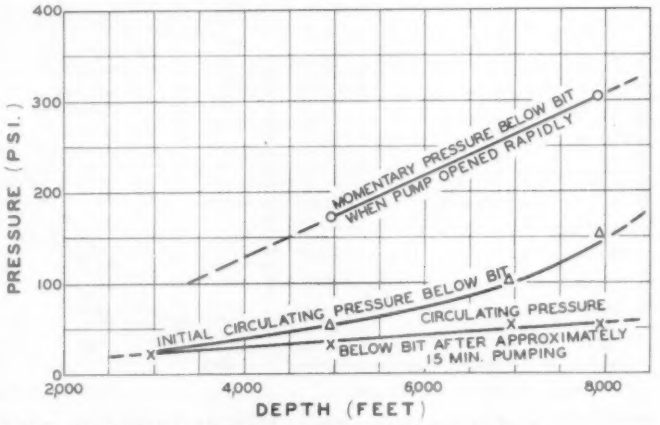

AVERAGE TIME TO DROP 90 FT. OF PIPE:
TEST NO.;
1 40 SECONDS
2 33 SECONDS
4 38 SECONDS (ALL SURGES LESS THAN 50 PSI.; POINTS NOT PLOTTED)
5 41 SECONDS
PRESSURE SURGE (PSI.)
DEPTH (FEET)

PRESSURE SURGES (2) due to running slowly one stand of drill pipe (Fig. 3).

Measurements of the magnitude of these surges were made and the results showed that surge pressures are developed when spudding and running pipe, which are often large enough to be equivalent to up to 2.1 lb. per gallon increase in mud density. If annular clearances are small, balling is present, or if the hole contains loose shale these surge pressures would often be even greater. It is these surges which account for the fact that losses usually occur after a weak zone has been penetrated by the bit. Such a zone may be subjected only to hydrostatic pressure when it is drilled, but the surges oc-



PRESSURE SURGES (3) due to spudding rapidly 35 ft. of pipe while circulating (Fig. 4).


MOMENTARY PRESSURE BELOW BIT WHEN PUMP OPENED RAPIDLY
INITIAL CIRCULATING PRESSURE BELOW BIT
CIRCULATING PRESSURE BELOW BIT AFTER APPROXIMATELY 15 MIN. PUMPING
PRESSURE (PSI.)
DEPTH (FEET)

CIRCULATING PRESSURES as measured below the bit in Test 2 (Fig. 5).

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CARBON-MOLY TO CROLOY 9 • CARBON-MOLY • CROLOY ½
CROLOY 1¼ • CROLOY 2 • CROLOY 2¼ • CROLOY 3-M • CROLOY 5
CROLOY 5-SI • CROLOY 7 • CROLOY 9-M

All of these intermediate alloys, developed for oil refinery service, are being used extensively in a wide variety of high temperature applications. All have earned universal acceptance and praise for giving optimum service satisfaction with economy over the years. The accompanying table shows the extensive range of temperature, pressure, corrosion, and oxidation conditions met by B&W Alloy Tubing. Technical data on these analyses is contained in Bulletin TB-12, available upon request. Call on Mr. Tubes—your B&W Tube Representative—to get the benefit of the extensive tubing service he represents, on your specific petroleum processing applications.

CARBON-MOLY—0.50% Mo—For services to 1050F requiring higher creep strength than carbon steel with no increase in corrosion or oxidation resistance.

CROLOY ½—0.60% Cr, 0.50% Mo—For operating conditions to 1075F requiring properties superior to carbon-moly with respect to graphitization and creep strength.

CROLOY 1¼—1.25% Cr, 0.50% Mo, 0.75% Si—Economic grade good creep strength properties up to 1100F. Somewhat more corrosion resistant than chromium-free steels.

CROLOY 2—2% Cr, 0.50% Mo—Economic grade for resisting both oxidation and corrosion, with excellent high-temperature strength, up to 1150F.

CROLOY 2¼—2.25% Cr, 1.00% Mo—Exceptionally high creep strength up to 1175F for polymerization and high pressure cracking. Otherwise similar in properties and characteristics to Croloy 2.

CROLOY 3-M—3% Cr, 0.90% Mo—Somewhat better creep properties, and resistance to corrosion and oxidation up to 1175F than Croloy 2.

CROLOY 5—5% Cr, 0.50% Mo—For operating conditions up to 1200F where corrosion resistance is a primary requirement—with creep strength and oxidation resistance superior to Croloy 2.

CROLOY 5-Si—5% Cr, 0.50% Mo, 1.50% Si—For operating conditions up to 1300F where oxidation resistance is a primary requirement. Excellent resistance to scaling under straight oxidizing conditions.

CROLOY 7—7% Cr, 0.50% Mo, 0.50-1.00% Si—For operating conditions up to 1250F where corrosion resistance is the primary requirement. Somewhat more oxidation resistant than Croloy 5.

CROLOY 9-M—9% Cr, 1% Mo—For severe operating conditions up to 1300F where high corrosion and oxidation resistance are essential as in hydrogenation processes.

Steels from CROLOY 1¼ upward are electric furnace alloy steels which are normally cleaner and of better quality than open hearth steels. This contributes to greater reliability and improved creep properties at elevated temperatures.

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TA-1685

TABLE 1—SUCCESSFUL SPINNER SURVEYS PERFORMED IN THE GULF COAST DISTRICT

Field—	Well	Total depth (ft.)	Type mud	Density (p.p.g.)	Interval of loss (ft.)	Casing size and depth (in.) (ft.)	Distance from casing (ft.)	Distance from total depth (ft.)
Timbalier Bay	La. State "PP" 8	7,414	High pH-lime-oil emul.	11.4	1,758	10¾ at 1,752	6	5,656
Timbalier Bay	La. State "PP" 8	7,546	High pH-lime-oil emul.	11.8	7,344	7⅝ at 7,344	0	2
Fannett	C. W. Burrell 21	3,085	Saturated salt-starch	10.3	2,250	10¾ at 1,595	655	835
Fannett	C. W. Burrell 21	2,077	Fresh-water mud	9.2	2,036-41	10¾ at 1,595	441	41
Fannett	C. W. Burrell 21	2,123	Fresh-water mud	9.1	2,035-41	10¾ at 1,595	435	88
Fannett	C. W. Burrell 21	2,123	Fresh-water mud	9.1	2,020-44	10¾ at 1,595	425	123
Black Bay	La. State "QQ" 2	11,810	High pH-lime-oil emul.	10.0	10,501-02	9⅝ at 10,000	1	309
Black Bay	La. State "QQ" 2	10,714	High pH-lime-oil emul.	15.3	10,640-42	9⅝ at 10,000	140	74
Krotz Springs	Haas & Hirsch "E" 5	5,763	Fresh-water mud	9.5	2,581	13⅜ at 2,580	1	3,182
Krotz Springs	Haas & Hirsch "E" 5	5,763	Fresh-water mud	9.0	4,153	13⅜ at 2,580	1,573	1,610
Bully Camp	A. L. Barrilleaux 1	7,232	High pH-lime	10.7	2,580-85	10¾ at 2,520	60	4,652
Bully Camp	A. L. Barrilleaux 1	7,713	High pH-lime	10.5	3,335-40	10¾ at 2,520	815	4,378
Bully Camp	A. L. Barrilleaux 1	7,713	High pH-lime	11.0	4,470-71	10¾ at 2,520	1,950	3,234
Bully Camp	A. L. Barrilleaux 1	7,761	High pH-lime	12.3	4,473-74	10¾ at 2,520	195	3,231
Bully Camp	A. L. Barrilleaux 1	7,761	High pH-lime	11.3	4,479-80	10¾ at 2,520	1,947	3,237
Edgerly	T. S. Stegall 1	8,957	High pH-lime	15.0	8,941-8,947*	9⅝ at 8,200	741	16
Quarantine Bay	La. State "QQ" 72	10,949	High pH-lime	14.0	9,386-88	9⅝ at 9,200	186	1,749
Peach Point	S. S. Perry 2	10,759	Silicate	17.4	10,746	7 at 10,728	16	13
Peach Point	J. H. Caldwell 1	10,580	Silicate	14.5	7,330-70	9⅝ at 7,304	26	2,250
Little Chenier	M & M Land Co. "A" 1	6,016	Fresh-water mud	9.5	3,595-96	13⅜ at 3,518	477	2,421
Little Chenier	M & M Land Co. "A" 1	10,117	High pH-lime	15.1	3,595-98	13⅜ at 3,518	477	6,522
Little Chenier	M & M Land Co. "A" 1	10,117	High pH-lime	13.7	8,293-95	9⅝ at 8,212	81	1,824
Little Chenier	M & M Land Co. "A" 1	10,117	High pH-lime	13.2	8,370-75	9⅝ at 8,212	158	1,737
Quarantine Bay	La. State "QQ" 81	10,939	High pH-lime	13.5	9,545-54	9⅝ at 9,277	268	1,394
Quarantine Bay	La. State "QQ" 74	10,428	Fresh-water mud	11.9	3,194-97	10¾ at 3,063	131	7,234
Quarantine Bay	La. State "QQ" 74	10,428	Fresh-water mud	12.3	3,200-01	10¾ at 3,063	137	7,228

*Two separate losses. Note: Losses on bottom, 0; losses at casing seat, 3.

TABLE 2—TABLE OF MUD PROPERTIES AND PIPE-CASING COMBINATIONS FOR WELLS IN WHICH TESTS WERE MADE

Test No. Type of mud used	Density (p.p.g.)	Funnel visc. (sec.)	Stormer visc. (cp.)	Thixotropy (g.m.s.) Init.	Thixotropy (g.m.s.) 10 min.	Casing size (in.)	O.d. rubber protectors (in.)	Annular area (sq. in.)	O.d. drill collars (in.)	Annular area (sq. in.)	O.d. tool joint (in.)	Annular area (sq. in.)	O.d. drill pipe (in.)	Annular area (sq. in.)	Maximum recorded pressure (psi.)
1. Caustic and quebracho thinned, fresh water mud	10.1	44	...	(*)	(*)	7	4½	14.3	4½	14.3	3⅞	18.5	2⅞	23.8	15,000
2. Same	11.8	46	52	0	1	7⅝	4⅞	18.5	4½	21.2	4½	21.1	3½	27.4	7,500
3. Lime-treated mud	16.2	82	63	4	7	7	...	...	4	17.6	3⅞	18.5	3½	20.3	15,000
4. Sodium silicate mud	14.0	49	...	2	8	9⅝	6⅝	27.1	6¼	30.9	5⅞	36.8	4½	46.2	7,500
5. Lime-treated mud	11.8	43	27	0	0	9⅝	6¾	25.8	6¼	30.9	6	33.3	4½	46.2	15,000

*Slightly cement cut.

curring during later drilling may be great enough to cause the formation to break down.

Pressures and Methods of Control

Let us examine the various sources of pressure in wells with the view of keeping them to a minimum so as to prevent loss of circulation. It should be mentioned that it will not be profitable to employ all the suggested measures in all wells as some result in slowed drilling operations, and their use is not warranted in drilling areas which seldom give lost-circulation difficulties. In exploratory wells, drilling with high-density muds, areas where losses are frequent, or in holes which have already experienced loss of circulation, every possible preventive measure is warranted.

Hydrostatic pressure . . . This is the major source of pressure in a well. The density of the mud should not be carried in excess of the minimum required to hold back formation pressures, but nothing can be done to reduce pressures below this level without resorting to expensive and complicated procedures of drilling under pressure. Normally, controlling the pressures is limited to keeping them as close as possible to the required hydrostatic pressure.

There is a large swabbing effect during pipe withdrawal that may amount to a bottom-hole pressure reduction of 300 to 400 psi. when the mud has a high gel strength or annular clearances are small. To keep gas shows from the mud the density is carried high enough to balance formation pressure and to overcome this swabbing effect, which may cause 0.6-0.8 lb. per gallon excess mud weight in high-gel-strength muds. Keeping low gels and viscosity minimizes the excess mud density that must be carried.

Pressures due to rapidly running pipe and spudding . . . It is possible to slow the rate of running pipe and to work the pipe slowly when checking the hole, reaming, or making connections and thereby avoid very large pressure surges.

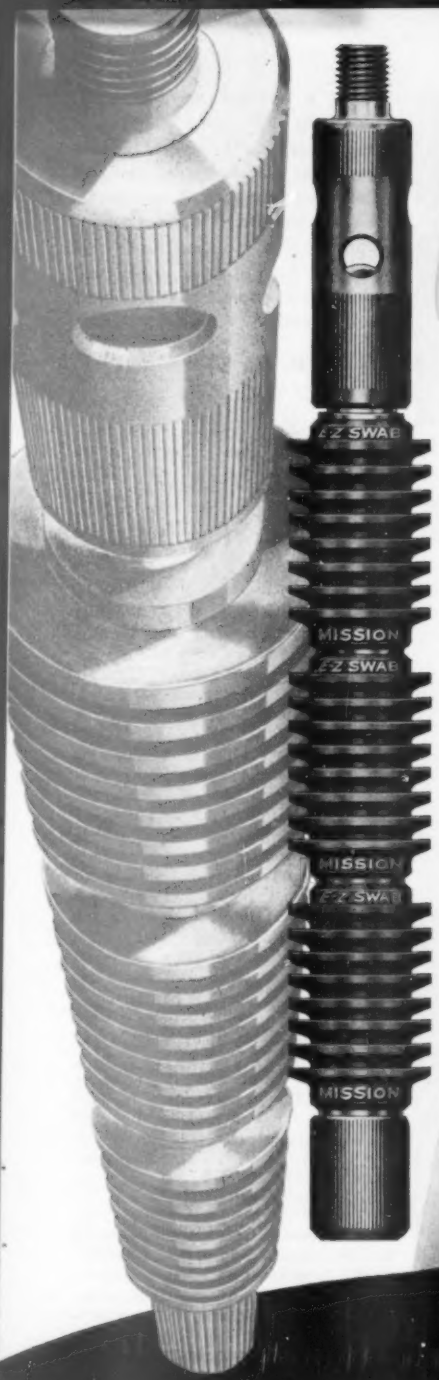
Fig. 2 gives the results of tests made in five wells to determine the pressures developed in excess of hydrostatic pressure when pipe is run in the hole at normal rates. For this work a pressure recorder* was attached in place of the bit so that the surge pressures could be measured. The connecting sub had 2⅝-in. ports through which circulation could be established. Surges as large as 600 psi. at 8,500 ft. were found. This is equivalent to a momentary increase in mud density of 1.4 lb. per gallon. The surges were also found to increase with depth.

Table 2 lists the pipe in the wells tested, and all the testing was done through 9⅝-in. casing or smaller openings. Tests made to date in holes as large as that made with a 9⅞-in. bit have shown low surge pressures.

Measurements were also made in which plugged stands were run to determine the effect of running pipe with solid lift nipples, running a back-pressure valve, or running a plugged bit. This substantially increased the surges shown in Fig. 2. As an illustration, in Test 1 the surge pressure was 625 psi. at 8,500 ft. when the stand was run in 14 seconds. With a plugged stand

(Continued on page 88)

*7,500 or 15,000 psi. maximum drill-stem-test recorders.



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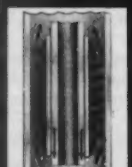
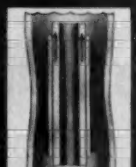


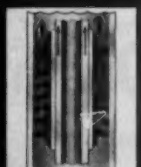
On the down stroke fins are in normal upturned position, allowing E-Z Swab to fall free.

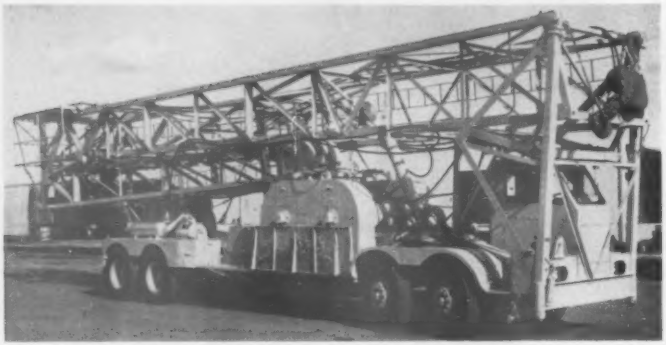
Flexibility of fins allows EZ Swab to pass smoothly through tight spots on up or down stroke.



E-Z Swabs automatically by-pass fluid overload. Each rubber will lift approximately 400 feet of fluid. Rubber fins bend down and unload excess fluid.

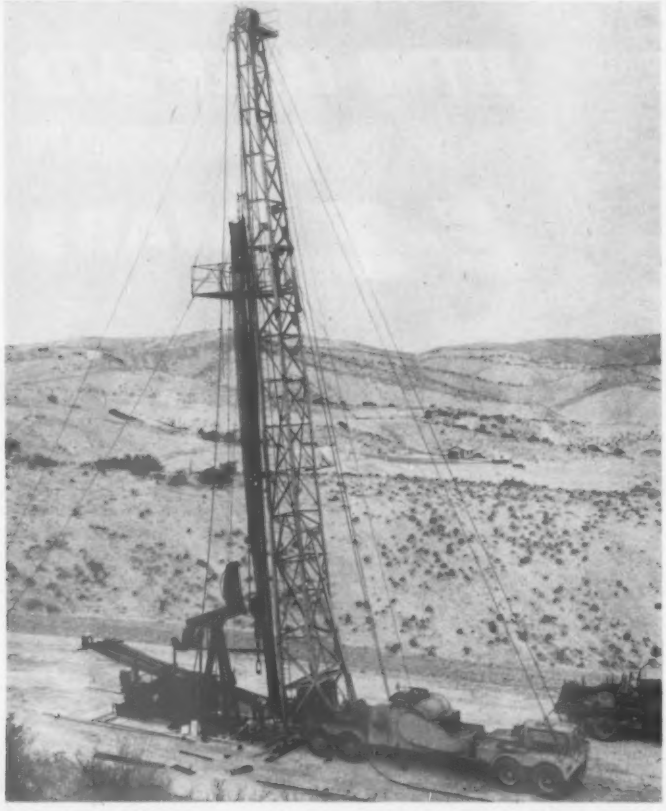
After overload fluid is passed, fins spring up and seal against tubing.





RICHFIELD'S NEW SERVICING unit in the traveling position. Fully loaded, the unit weighs about 28 tons with the two front tandem axles taking approximately a 12-ton load.

Richfield's Servicing Unit



IN HOISTING POSITION on a well in the Cuyama region. The 90-ft. folding-type derrick is raised in two stages after the unit is driven up to the well site.

Operating in Cuyama Valley

Here is a self-propelled rig, weighing 28 tons, which has been in service for several months and has satisfactorily met all field requirements. It represents a consolidation of standard components—the hoisting unit and derrick, having been used previously in semitrailer-mounted equipment.

by D. H. Stormont
West Coast District Editor

A NEW self-propelled servicing unit, containing many features which make for easy, speedy road operation, rapid conversion from the road to working condition, and dependable, fast well pulling, recently was placed in operation in Cuyama Valley fields by Richfield Oil Corp.

Designed for use on 6,500-ft. wells and capable of hoisting 9,000-ft. of wet 2½-in. tubing, the unit consists of a 90-ft. 70-ton-capacity folding derrick. A rear-mounted diesel drives the unit at road speeds up to 40 m.p.h. It will negotiate a 25 per cent grade at 3 m.p.h.

Self-propelled with the base of the derrick at the forward end, the unit is driven onto the well site. When the master control is switched, the prime mover used to propel the unit then becomes the power source for hoisting. Control circuits for both transmissions are interlocked so that it is impossible to shift either transmission while the other is in use. Hoisting operations are facilitated by torque-converter drive, hydraulically actuated two-speed transmission, and Hopper air clutches.

Loaded with the integral air compressor and light plant, fully strung lines and blocks, racking platform of rod hanger, air-operated tubing tongs, and CO_2 bottle for operation of blowout preventer, the unit weighs about 28 tons. Equipment is positioned so that the four front wheels carry approximately a 12-ton load, and the eight rear wheels approximately 16 tons.

Road operation . . . When operating on the road, power from the six-cylinder G.M.C.'s 6082 diesel is transmitted to the dual rear-wheel drive through an Allison torque converter, and an Allison full-torque shifting three-speed hydraulically actuated planetary transmission. The latter is designed specifically for use with a torque converter. All drives are Spicer propeller shafts.

The road-drive transmission is controlled from the front-mounted cab by a simple lever; there is no motor clutch.

In addition to the neutral position, three forward-drive ratios and one reverse are provided. This combination of components results in a true fluid-drive vehicle, with all of its inherently desirable characteristics. The only operational difference between the drive on this unit and contemporary automotive fluid drives is that the driver selects a transmission ratio as desired. This results in easier control on difficult terrain. All controls relative to road driving are rendered inoperative when the transfer control is switched to the hoisting position. This action also automatically sets the air brakes in the rear wheels at 40-psi. pressure.

Because the load required is beyond that of a single axle, the front running gear employed consists of two 14,000 lb. rated Hopper axles mounted in tandem. Conventional mechanical steering is employed, assisted by two Garrison hydraulic steering boosters, one on each axle, which make for fingertip steering.

However, even in the event of a complete hydraulic failure, the driver retains full control through the solid mechanical linkage. The center-point steering linkage incorporates a differential arrangement, which assures correct wheel angularity at all positions of steering and reduces tire wear. Turning radius of the vehicle is approximately 42 ft., which permits it to negotiate with ease the winding roads in the mountainous fields of Cuyama.

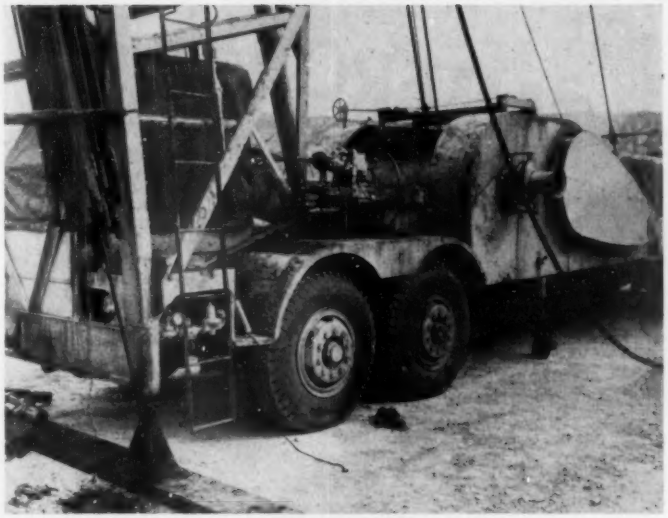
Hoist operation . . . Power for the double-drum hoist comes through a right-angle rear box when the road drive transmission is in neutral, and is delivered to a second Allison full-torque shifting transmission as in road operations. Final drive to the hoist is through an adaptation which takes the side pull of the chain. Two forward and one reverse ratios are provided for hoisting operations. Transmission controls are provided at the main drum operator's position. They consist of simple push buttons, as the hoisting transmission is air controlled.

Hopper air-operated friction clutches are used in both the main drum and sand reel. Main-drum controls are located at the base of the mast and include a safety shutdown control, as well as an independent foot-and-hand-operated throttle and hand-operated clutch valves. Safety shutdown controls are provided at all operational positions—main drum, sand reel, and cat head.

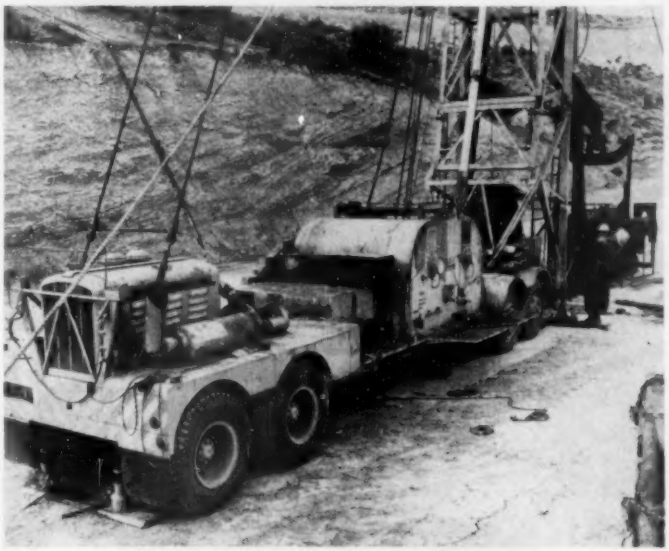
The main drum which spools 12,000 ft. of 9/16-in. line is separately mounted on its shaft and rotates freely when the clutch is disengaged. This provision lessens drag and permits fast descent of the empty blocks. The drum is capable of exerting a single-line pull of 40,000 lb.

Another feature of the main drum is the provision for operating with double lines. In normal hoisting, the dead line is anchored to a tie-down on the chassis at the base of the derrick, permitting use of a weight indicator. When it is desired to switch to two fast lines, sockets and line fittings permit the change to be made quickly. Tubing-drum core diameter and length are such that when operating with the double-line setup, one layer of line raises the blocks to the crown without turnback. This feature eliminates any danger of line fouling.

Erection of derrick . . . When the unit drives up to a well requiring servicing,



LEVELING AND STABILIZATION of the unit are accomplished by two screw jacks at front and four rachet-type jacks placed midway and at the rear. Controls for transferring from road to hoisting operation automatically set a 40-psi. pressure on the rear wheels.



THE REAR MOUNTED DIESEL propels the unit down the highways and then when a master control is switched the engine becomes the power source for hoisting. The hoisting transmission is air controlled from the operator's post at the base of the derrick.

CAMERON
FORGED STEEL
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NO MORE
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PREMIUM QUALITY
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the front bumper is spotted 6 ft. away from the well center. In the event that the approach to the well is not level, a device located in the cab tells the driver the exact distance to stop the unit away from the well head. This places the crown block and elevator directly over the well. As the Guiberson double-sheave traveling block operates with the flat side toward the derrick, no interference is offered by the pumping unit. With the vehicle in position, leveling and stabilization are accomplished by two screw jacks at front, and four ratchet-type jacks placed midway and at the rear. Leveling devices installed at the front and rear of the vehicle indicate proper position in both the transverse and longitudinal directions.

Erection of Derrick

Erection of the folding-type derrick, which has a hook capacity of 70 tons with four lines in action, is accomplished in two stages which can be performed in as little as 10 minutes. Entirely hydraulic with the power being supplied by the takeoff from the hoist prime mover, the system was designed to protect the equipment regardless of the operator's action at the control valve. Bleed orifices protect against line failure at any point in the erection or lowering operation.

First-stage erection is accomplished by a single-acting two-stage hydraulic ram controlled by a four-way hydraulic valve located at the side of the rig. As the derrick is hinged ahead of the center of gravity, the mast always rests against the ram throughout its cycle, eliminating the necessity for a double-acting cylinder to tip the derrick for lowering.

A second four-way valve controls two small double-acting cylinders on a separate branch of the hydraulic system, which will either push the rear leg supporting gate into position for bolting up, or pull it out of position for lowering the derrick. Interconnecting links between the derrick gate structure limit upward travel of the main ram, and eliminate the requirement of skill on behalf of the operator. They also bring the locking bolts into position so the derrick can be quickly and easily locked into the erect position by two spring-loaded handle-operated bolts.

The second step in the erection utilizes the same hydraulic system as the first stage through another interlocked four-way valve. The second-stage valve cannot be operated except when the first stage is locked in neutral, and vice versa. Upper section of derrick is hinged in its back legs to the top of the center section and rests in an inverted position against the back

of the derrick until two ground-controlled latches are released. Then, by means of four short double-acting cylinders, acting about the derrick hinge and controlled by a single four-way valve, the upper section swings out and up through an arc of about 182°, and comes to rest on top of, and in line with, the center section. Two spring-loaded latches and centering pins automatically lock the two sections together.

Erection of the upper section automatically extends the racking platform into working position. Lowering of the upper section is accomplished simply by reversing the four-way valve. The latching pins retract automatically only when sufficient pressure is available to insure that the system is full. The same pressure raises and overturns the upper section that releases the latches. A "bean" type safety control provided in the rams raising either the upper or lower section of the mast prohibits dropping of the mast in the event of any failure of hydraulic lines. In addition, provision is made for a suitable safety control which maintains pump pressures on the rams during the lowering cycle, and also after the derrick has been erected, to insure there are no air pockets or leaks in the hydraulic system.

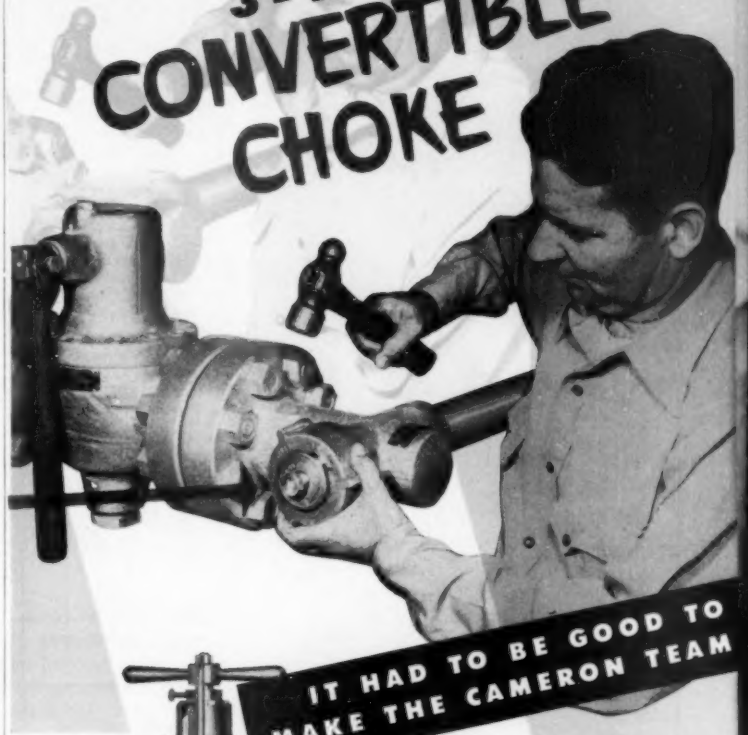
As stated, the racking platform automatically extends when the upper section is raised. Space is provided in the platform for racking 180 doubles (10,800 ft.) of 2½-in. tubing. Capacity of the rod hangers used is eighty 60-ft doubles.

Auxiliary equipment mounted on the unit includes an air compressor of 75-cu. ft. per minute displacement, belt driven through an air clutch disconnect from the main drive shaft and a 3-kw. light plant. In rear of the cab a rack is provided for carrying air-operated tubing tongs, and a bracket is provided on the mast for suspending the tongs while they are being used. Also included are an air-operated tubing spider and CO_2-operated blowout-prevention equipment.

In general, with the exception of the tandem front axle, the unit represents a consolidation of standard components—the hoisting unit and derrick having been previously used in semi-trailer-mounted equipment. The development of the tandem front-axle assembly and its application to this equipment has resulted in a remarkably compact and maneuverable unit.

The unit, manufactured by Hopper Machine Works, Inc., Bakersfield, Calif., has been in service since January and has satisfactorily met all field requirements.

CAMERON
3-WAY
CONVERTIBLE
CHOKE



IT HAD TO BE GOOD TO MAKE THE CAMERON TEAM

The Cameron Type "H" Production Choke may be converted to any of three types, utilizing a single choke body: Positive, Adjustable, or Combination Positive and Adjustable.

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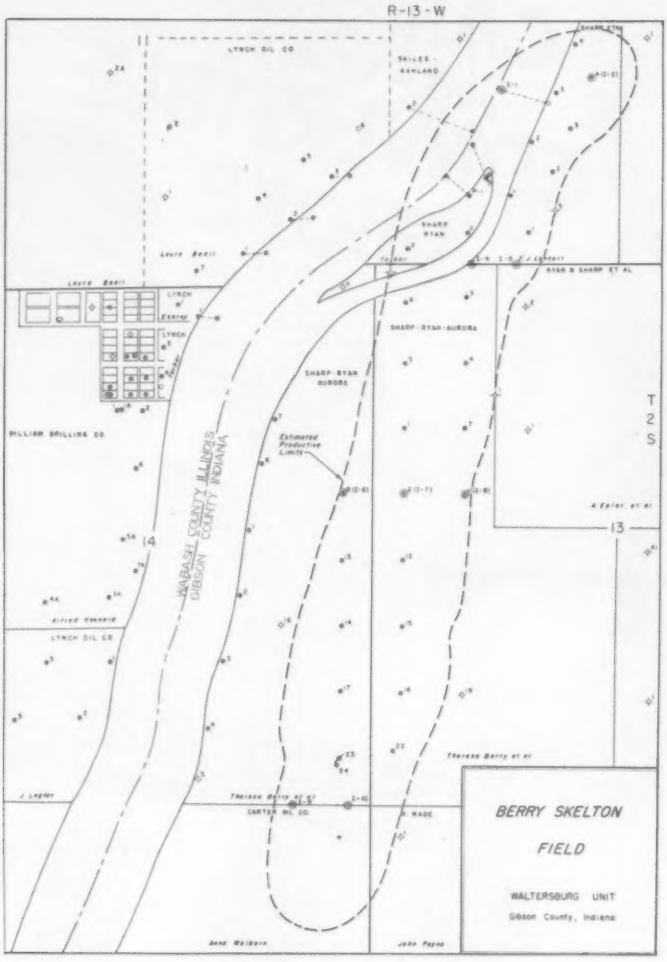

Indiana's Largest Active Water Flood . . .

. . . the amazing Berry Skelton secondary-recovery project produces 1 of every 13 bbl. of oil coming from the whole state. It is one of the largest such operations in the eastern interior basin.

Staff report, James A. Lewis Engineering, Inc.

THE Berry Skelton water-flooding project is the largest active water flood in Indiana, both in total oil reserves and present rate of production. It is located in Sections 12, 13, 14, and 23-2s-13w, directly across the river from the small town of Rochester, Ill. The relative size of this project can best be understood when it is realized that 1 of every 13 bbl. of oil produced in Indiana today is derived from the Berry Skelton water-flooding unit.

The discovery well in the field was drilled by Olen Sharp in June 1948. This well was a typical wildcatter's dream, encountering approximately 50 ft. of saturated Waltersburg sand at 1,905 ft. in depth. By the end of 1948, 20 Waltersburg wells had been completed at which time further development was halted by high water.

The primary development of the field was completed during the summer of 1949 with the drilling of 10 additional Waltersburg wells. The field as delineated by this primary drilling consisted of a long narrow stratigraphic trap with the major axis running northeast-southwest, roughly paralleling the Wabash River. The field dips gently from north to south, encountering basal water in the southern quarter of the field.

Although engineered water flooding was not a widely accepted practice in the tristate area in early 1948, Sharp recognized the potentialities of the field for water injection and engaged the consulting firm of James A. Lewis Engineering to accumulate data during the development period. This accumulation of data was begun with the drilling of the second producing well and has continued uninterrupted to date.

By late 1949, 30 producing Waltersburg wells had been completed, proving up a productive area of 371 acres. At this time 30 core analyses, relative permeabilities to gas and water, water analyses, gas-oil ratios, and individual well tests, as well as other valuable laboratory and field data, had been assembled. A complete comprehensive engineering report was submitted in December 1949, which indicated three and one-half times as much additional oil could be obtained by water flooding as would be obtained by continued primary pumping.

Cost of the injection program to obtain this added oil was estimated at slightly over a quarter of a million dollars. Design of the water flood was such that it was necessary to unitize the entire operating and royalty interests overlying the productive Waltersburg sand lens into one large unit. This unitization required the sig-

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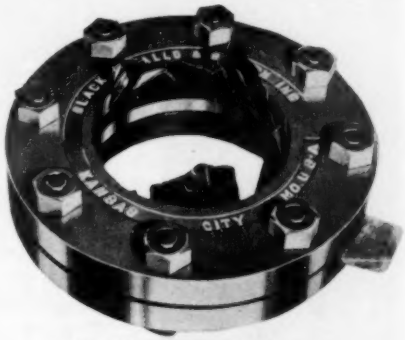
Regardless of your pressure application – air, gas or liquid – bland or corrosive, BS&B has the code-accepted Safety Head for you. Get the facts, get safety, get a BS&B Safety Head. Write for catalog giving complete details.



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BS&B Safety Heads are a common sight in the oil industry. Small in comparison with other equipment, they become conspicuous only during an emergency they help keep under control. Behind BS&B is 60 years of experience in manufacturing equipment for the oil industry. BS&B knows pressure vessels and lines and how to put controlled safety into them with the right BS&B Safety Head. You'll find them on oil and gas separators, gas scrubbers, emulsion treaters, storage tanks, heat exchangers, shells, refining pressure vessels, natural gas pipe lines, compressor lines and in condensate recovery-pressure maintenance plants.

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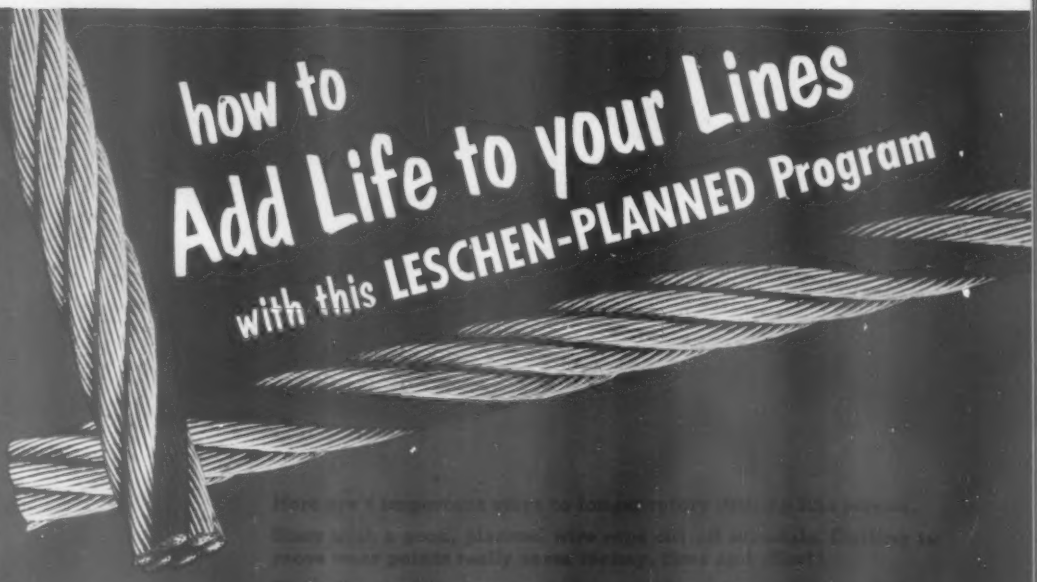


how to Add Life to your Lines with this LESCHEN-PLANNED Program

1. SAVE with a planned cut-off schedule

ROTARY DRILLING CUT-OFF CHART

Line Size	Drill Pipe Size	Excess Wgt. in 1000 Lbs.*	Approx. Length to cut in ft.**	Ton Miles to Cut	Trips per cut by depth									
					to 4,000	to 5,000	to 6,000	to 7,000	to 8,000	to 9,000	to 10,000	to 11,000	to 12,000	12,000 & deeper
1	3½	15	25	500	14	10	8	6	5	4				
1⅛	3½	20	30	1000	23	17	14	10	8	6	4	3		
1¼	3½	25	35	1100	32	20	16	11	8	7	4	3	2	
1	4½	25	25	500	10	6	5	4	3	2				
1⅛	4½	30	35	1000	16	10	8	7	6	5	4	3	2	2
1⅛	4½	30	40	1000	24	15	12	9	7	5	4	3	2	2
1¼	4½	50	40	1100	15	10	8	6	5	4	3	3	2	2

*Excess weight includes entire hook load less weight of drill pipe.
**On conventional drum sizes.

2. CHECK hook loads for better service

Line	Approximate MAXIMUM HOOK LOAD in Pounds						
	1 Part	2 Parts	4 Parts	6 Parts	8 Parts	10 Parts	12 Parts
1"—Wire Rope Core	17,960	34,480	63,860	88,570	109,180	126,190	139,980
1⅛"—Wire Rope Core	22,600	43,460	80,360	111,450	137,390	158,790	176,150
1¼"—Fiber Core	25,840	49,690	91,880	127,430	157,090	181,550	201,400
LEAD LINE Pull Factor	——	.5200	.2812	.2027	.1645	.1423	.1283

Lead line pull factor x load lifted = Tension on lead line.

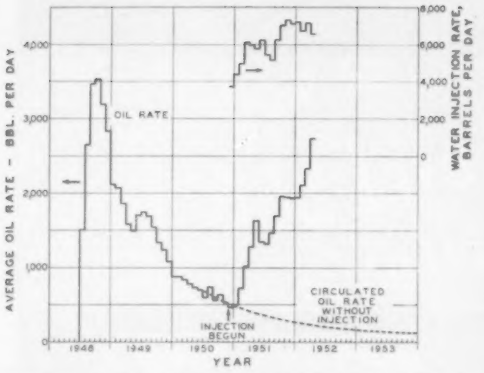
3. WATCH breaking strengths for greater safety

BREAKING STRENGTHS—In tons of 2,000 lbs.				
SIZE	6 x 19		6 x 37	6 x 7
	Fiber Core	Wire Rope Core	Fiber Core	Fiber Core
⅜	6.10 .23	6.56 .25	5.77 .22	
7/16	8.27 .31	8.89 .34	7.82 .30	
½	10.70 .40	11.50 .44	10.20 .39	10.30 .38
9/16	13.50 .51	14.50 .56	12.90 .49	13.00 .48
⅝	16.70 .63	17.90 .69	15.80 .61	15.90 .59
¾	23.80 .90	25.60 .99	22.60 .87	
⅞	32.20 1.23	34.60 1.35	30.60 1.19	
1	41.80 1.60	44.90 1.76	39.80 1.55	
1⅛	52.60 2.03	56.50 2.23		
1¼	64.60 2.50	69.40 2.75		

4. USE the right rope for the job

APPLICATION RECOMMENDATIONS				
Line	Wire Rope Construction	Core	Type	Grade
Rotary Drilling	6 x 19 Seale	Fiber or Wire Rope	Preformed Preferred	HERCULES® *Red-Strand*
Bailing and Sand Line	6 x 19 Seale	Fiber	Preformed	HERCULES® *Red-Strand*
Core Barrel and Bailing Lines	6 x 7 Bright or Galvanized	Fiber	Preformed	HERCULES® *Red-Strand*
Tong Lines	6 x 19 Filler or 6x37 Seale	Fiber	Preformed Preferred	HERCULES® *Red-Strand*

LESCHEN WIRE ROPE



RESERVOIR PERFORMANCE—Berry Skelton field. (Note: On map, wells to west produce from shallower formation.)

OLEN D. SHARP, independent oil producer, Evansville, operates the property for Ryan & Sharp, Aurora Gasoline Co. and others.

natures of people residing all over the United States and in many foreign countries.

Details of Flood Project

The actual physical installation of the project was begun in late summer 1950, and was completed and the injection of water started November 29, 1950. Five new injection wells were drilled, four producing wells were converted to injection, and two new producing wells were drilled specifically for the water-flooding program.

Water supply . . . A fresh water supply was developed at 27 ft. in river gravel and produced by three water wells equipped with electrically driven turbine-type pumps. A central plant was constructed to house the two high-pressure Worthington VTE pumps, water filtering and treating equipment, transfer pumps, header assemblies, etc. This plant was designed to furnish 8,000 bbl. per day of high-pressure (1,200 psi.) treated water to the nine injection wells on a 24-hour continuous basis. The water as produced from the supply wells is of excellent quality with respect to dissolved salts. Since the source beds are recharged from the Wabash River, however, the problems of oxygen corrosion and bacteria are present. The chemical treatment to combat these difficulties has been very successful to date.

Oil production . . . The water flood has been successful from its inception, showing a definite increase in oil production 2 months after beginning injection. By October 1, 1951, 10 months after beginning injection, production had increased from a preinjection level of less than 500 bbl. per day to approximately 2,000 bbl. per day. It is anticipated that production can be held at this level for approximately 3 years or increased to a higher level for a shorter period. In gaining this increase some wells in the field have increased from 10 bbl. to 200 and 300 bbl. per day.

Flood pattern . . . Since Berry Skelton field is only from two to three well locations wide (1,600 ft.) and 13 locations long (9,200 ft.) the choice of possible water-flood patterns was not great. A split line-drive type of flood was installed whereby four rows of injection wells were drilled or converted across the width of the field separating it into three basic segments.

The project was further complicated, however, by the presence of basal water in the southern third of the field. This basal aquifer has been controlled to date, however, by carefully prorating the southern producing wells to less than 150 bbl. of total fluid (oil and water per day). By this method the per cent water production on the south two-thirds of the field has remained unchanged since water injection was initiated (that is, the production of water has increased in direct proportion with oil production). Water production in the north third of the field has of course increased since no water had been produced from this area prior to water injection.

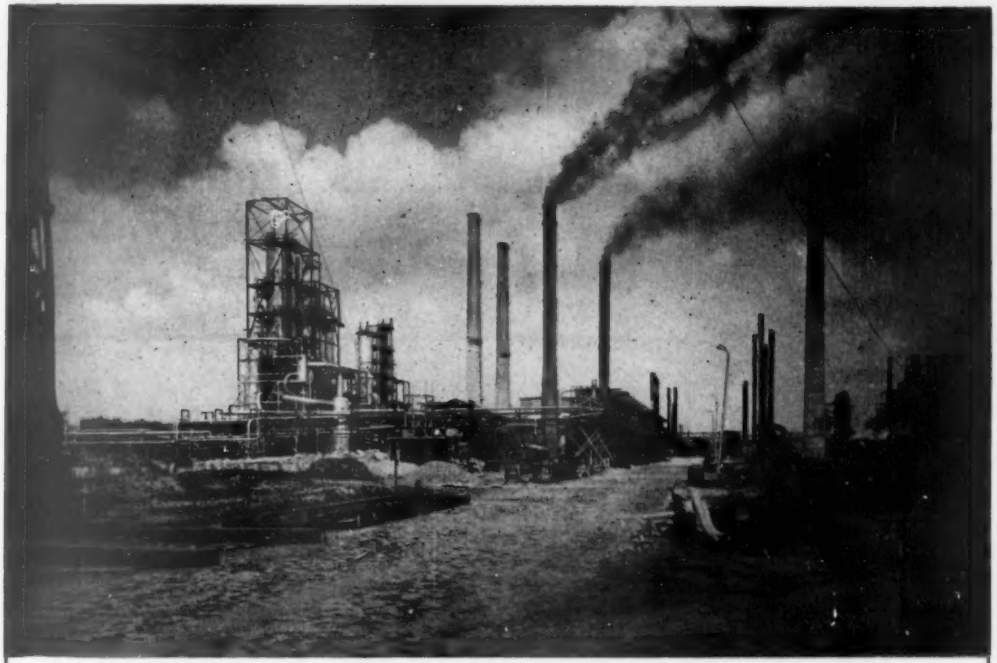
Performance . . . As of March 1, 1952, the producing rate from the unit was 2,300 bbl. of oil per day. A total of 2,696,983 bbl. of water had been injected while 646,438 bbl. of oil was produced. The ratio of water injected to oil production is, of course, high at this stage of the flood since well over a million barrels of water was necessary to fill the void created by production prior to water flooding. At the present rate of production gross income from the project is over $200,000 per month.

Operational Problems

Most of the problems which have been encountered to date have been normal, although two were somewhat unusual to this operation. Since the field is located in the flood plain of the Wabash River, much difficulty has been encountered due to flood waters. Some parts of the field have been inundated by as much as 12 ft., which has necessitated the building of substructures and earthen mounds for all equipment. All roads into the field are also impassable during much of the winter and it is necessary to bring all necessary supplies and personnel into the project by boat during these months.

As oil production from the field continued to increase the operator was also faced with the problem of a fuel supply to run the many oil heaters, individual well-pumping units, and central plant. Natural gas produced with the oil had been utilized prior to water flooding, but this source was highly inadequate for the larger flood requirements. Gasoline or butane was impractical in this case due to high cost and the inaccessibility of the field during the winter months. Sharp met this problem by swinging a high-voltage electric cable 1,200 ft. across the Wabash River to furnish electricity for the individual wells. A fuel-vaporizing system was installed at the central plant to vaporize gas from the produced crude oil to run the two 100-hp. motors driving the high-pressure main pumps.

Through the intelligent application of engineering technology, Sharp will produce more oil from Berry Skelton field than he would have produced from two such fields by primary producing means alone.



They had a problem . . . When World-War-Number-Two laid waste many of the largest Oil Refineries in Europe, it also left the world pitiably short of new or replacement plant. In fact Global disruption was complete. Oil Companies were hard put to know where to turn for supplies of more and yet more refining plant. Their normal sources of supply — although working at fever pitch, were still saturated with orders that would take years to complete. But the need for plant was urgent. The Royal Dutch Shell Group solved their problem, in part, when they turned to Harveys. For Harveys have one of the most modern and fully equipped works in the world for the fabrication of all kinds of heavy and light plant for the Oil and many other Industries. *In fact Yours the problem – Harveys the answer!*

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New plant at Doe Run, Ky., producing

Petrochemicals From Ethane and Propane

by J. J. Hogan*

THE Mathieson Chemical Corp. plant at Doe Run, Ky., is in operation producing ethylene glycol. These additional materials are also produced in commercial quantities: ethylene oxide, ethylene dichloride, and other chlorinated hydrocarbons.

The Doe Run plant produces appreciable quantities of liquefied petroleum gas and natural gasoline. These materials are removed from the plant feed stream by fractionation during purification of an ethane-propane mixture.

The plant receives a hydrocarbon feed stream from the Gabe, Ky., plant of Tennessee Gas Transmission Co. (*The Oil and Gas Journal, March 10*), and processes it immediately. There is only a nominal amount of storage. To assure satisfactory communication between the two plants, radio stations have been installed so that word may be passed immediately from one to the other when changes in operating conditions are contemplated.

While the Doe Run plant was conceived for the primary purpose of producing chemicals, it was forced by the nature of the charge stock into the liquefied-petroleum-gas and natural-gasoline industry. The quantity of propane and heavier materials in the charge stock is about five times the quantity of ethane and lighter. The first operation at Doe Run is, therefore, the separation of liquefied petroleum gases—propane, butane, and isobutane—from the charge stock.

This is done in the normal manner with operation through a deethanizer, depropanizer, and debutanizer followed by a butane splitter separating normal butane from isobutane. There is also produced an appreciable quantity of natural gasoline which can be produced at specifications to meet the market demand. In fact, the quantity is great enough to permit movement in barges on the Ohio River even though the rise from pool level to maximum flood is in the order to 70 ft. and requiring mooring piles of this height. These are believed to be the highest of this type in the Ohio River.

The interesting feature in the processing of the feed stream is the use of refrigeration rather than absorption to separate the ethane from the heavier components of the feed stream. The temperature may be as low as 30° F. which can be easily reached with liquid propane.

Cracking Operations

The feed desired for the chemical portion of the plant is ethane, propane, or a mixture of these two. The chemical plant operates on the traditional method of converting the saturated feed stock to unsaturated material before processing to organic chemicals. This operation is carried out in the conventional manner by thermally cracking the charge stock at relatively high temperatures and low pressure to obtain the maximum yield of low-molecular-weight unsaturates and the minimum quantity of high-boiling materials which result from polymerization. The effluent stream from the cracking furnaces is fractionated for the separation of ethylene which is the charge material for chemical manufacture.

In the recovery of ethylene, the separation of hydrogen and methane from the heavier compounds is accomplished by refrigeration rather than by the older process of absorption and stripping. Because the mixture has a behavior akin to retrograde condensation, there is a top limit to the pressure at which this tower can operate with reasonably complete separation of the hydrogen and methane from the heavier components. The top temperature of the

*Mathieson Chemical Corp., Baltimore. Presented at Galveston meeting of Southern Gas Association.

Importance of Ethane And Propane in Petrochemicals

The most important hydrocarbons in the growing petrochemical industry at the present time are ethane and propane and butane. Methane is used directly in the manufacture of synthesis gases for ammonia and methanol and is to a remarkable extent replacing coal for this purpose. These uses, however, complete with the use of methane as fuel gas are not as interesting to the natural gas industry as are the newer developments, since there now exists a fuel-gas market greater than can now be served.

Because the saturated hydrocarbons, ethane, propane, and butane, are not particularly reactive, the first step in their use in the petrochemical industry is usually the conversion into the more reactive unsaturated compounds, ethylene, propylene and butylene. It is quite probable that most processing is now in this manner because this industry first developed in connection with refineries whose waste gases contained large quantities of those unsaturates.

Process methods were first established for these gases for this reason, and the natural trend when using saturated materials as charge stocks was to convert them into unsaturates which could be handled by known methods. However, the manufacture of chemicals from saturated hydrocarbons from natural gas has grown so rapidly that present studies are being directed toward their direct utilization.

Cracking Bypassed

It is highly desirable to omit the intermediate formation of unsaturates because this is usually accomplished by the wasteful method of thermal cracking. Not only does the cracking operation produce fuel gas and fuel oil but it normally consumes more fuel than it produces. Direct oxidation of ethane, propane and butane to oxides and aldehydes is in commercial operation, and it is confidently expected that as knowledge of catalysts and process conditions is accumulated, these direct processes will grow in use and will naturally increase the demand for ethane, propane and butane from the natural gas industry.

Initially most interest in petrochemicals was in refineries where suitable disposal of waste gases could not be made as fuel within the plant because fuel oil could not be sold. This caused a tendency to choose the Gulf Coast and Pacific Coast areas where liquid fuel requirements were not high. As the demands for petrochemicals grew, the natural tendency was to expand in the same area, drawing on the great reserves of natural gas available nearby. However, transportation problems arose because the greatest market for the materials remained in the northern and northeastern section of the country.

It was as a solution to these problems that Mathieson Chemical Corp. chose to install its initial petrochemical plant on the Ohio River near Louisville.

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Washington, April 14 (AP)—New frate rate increases estimated to cost the country's shippers about 678 million dollars a year were granted today by the government.
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tower is therefore held below 130° F. by indirect heat exchange with ethylene refrigerant.

The ethylene refrigerant is obtained in the conventional cascade systems using propane as the intermediate refrigerant. Propane is also used directly as the refrigerant on the other fractionating towers which separate the ethylene and ethane from the heavier components. The methane and hydrogen are used to supplement the fuel gas supply. Ethylene is the feed stock for the chemical plant, and ethane and heavier materials are recycled or withdrawn for other uses.

The chemical plant is based on the production of ethylene glycol which is the major constituent of permanent antifreeze solution. This is produced from ethylene oxide which is in turn made from ethylene by the ethylene chlorhydrin process which has been well established in this country and Europe for a number of years.

Byproducts

Various byproducts are also obtained in the process. It is, of course, possible by choice of process conditions to control the relative quantities of coproducts to some extent, but they cannot be entirely eliminated. Therefore, in addition to the ethylene oxide and ethylene glycol, which are primarily desired, there will be produced at Doe Run appreciable quantities of ethylene dichloride, dichlorethyl ether, and other chlorinated compounds, plus higher glycols.

Fortunately, there is commercial demand for all these materials. In particular, ethylene dichloride is an essential ingredient of tetraethyl lead antiknock compounds which are now in short supply. It is also important in the manufacture of the polyvinyl chloride polymers known by various trade names such as Vinylite and Koroseal. The chlorinated compounds are useful ingredients of solvent mixtures. Of the higher glycols, diethylene glycol is a substitute for glycerin and thus releases the latter compound for uses for which it is specifically required.

In the chlorhydrin process, which is used for the manufacture of ethylene oxide, ethylene and chlorine gases are mixed with water to form ethylene chlorhydrin. Almost 2 lb. of chlorine is required for each pound of ethylene. To meet this requirement at the Doe Run plant, Mathieson Chemical built an alkali-chlorine plant at Saltville, Va. This project brought on the market an added supply of electrolytic caustic soda. This new alkali-chlorine plant is the largest in the United States using the Mathieson stationary mercury cell.

It is during the reaction of ethylene, chlorine, and water to produce ethylene chlorhydrin that the chlorinated coproducts are produced. The waste gases are scrubbed for the recovery of any valuable material and the scrubbed gases may be recycled or used as fuel. The aqueous solution of the products is contacted with a lime slurry which causes the conversion of the ethylene chlorhydrin to ethylene oxide. This product together with all coproducts is stripped from the water solution and the various products are separated by conventional fractional distillation.

Some ethylene oxide will be sold for the manufacture of detergents and the remainder will be converted at Doe Run into ethylene glycol. This reaction is simply hydrolysis in water in very dilute acid solution and is followed by multistage evaporation of the water for the recovery of the various glycols. The glycols are separated by conventional fractionating under vacuum.

An interesting application of late developments in the chemical field is the use of ion-exchange agents similar to those used in boiler feed-water treating for the neutralization of the acid after the hydrolysis. This eliminates the need for supplying and handling in neutralizer such as caustic soda.

This combined operation shows how the natural-gas industry and the petrochemical industry operate very closely together. The liquefied petroleum gases and natural gasoline provide added income for the chemical plant although these hydrocarbons could not be recovered economically from the pipe line gas if it were not for the coexistence of the chemical plant. However, being recovered, the liquefied petroleum gases aid in the pipe-line gas-expansion program by assuring customers of an increased supply of propane and butane to supplement gas during the peak periods.

The Doe Run plant is particularly effective in this respect because it is so close to the major markets for these materials and, in emergency periods, can transport a relatively large quantity of material in a limited number of tank cars.

How to Combat Circulation Loss

(Continued from page 74)

run at the same rate the surge was 800 psi., or the equivalent of a momentary increase in mud density of 1.8 lb. per gallon.

Recent tests with an additional recorder mounted at a point up the hole from the bit have shown that the surges are present all along the pipe. If there is a 600-psi. surge at 10,000 ft., then it will be roughly 300 psi. at 5,000 ft. However, this is equivalent to increasing the mud density by 1.15 lb. per gallon at both 5,000 and 10,000 ft., and of course, all through the hole. Work done by Cannon° shows that swabbing pressures originating from a point off bottom are transmitted to bottom, and from this it is expected that surge pressures originating off bottom while running pipe would also be transmitted to the bottom of the hole.

Fig. 3 shows how these surge pressures due to running pipe may be lessened by slowed pipe-movement rates. Experience to date, including the use of a recorder mounted in a drill collar and used in the course of extended drilling at Peach Point and Hawkinsville, has shown that running pipe at 30 to 35 seconds per stand limits the surge pressures to around 200 psi. or less. Since the surges are small at the surface it is not necessary to slow the pipe on going in the hole until a depth of 3,000 to 4,000 ft. is reached. This adds only 20 to 30 minutes to trips as deep as 10,000 ft.

Even greater surges than those shown in Fig. 2 are developed when pipe is spudded while circulation is in progress. Fig. 4 shows the results of tests made to determine this effect. At fast rates of pipe movement, surges equivalent to momentary increases of up to 2.3 lb. per gallon mud were found. It was also shown that slow rates of pipe movement and reaming eliminated these surges when 20 seconds or greater were used to drop 35 ft. of kelly.

Balling . . . Balling of shale cuttings around drill collars, bit, pipe, or tool joints tends to close the annular space. Whereas the annular space circulating pressures will normally be 200 psi. or less, the full surface pump pressure will tend to be placed against the bore-hole wall when the annular space is closed, and depending upon the extent of the balling and surface pump pressure, may approach 1,500 to 2,000 psi.

Several techniques have proved to be of value in preventing balling. Slowing the rate of penetration, increased rates of circulation, and in particular, the use of oil-emulsion muds are of value.

Early detection of balling is often possible. Sharp increases in mud viscosity frequently show a ball has formed. In areas where balling is common a program of pulling the pipe several stands or to the casing at frequent intervals to check for a drag indicating balling is of value. If a ball is detected it can sometimes be pumped off, but if this fails, spudding to break off the ball is so likely to cause lost cir-

culation that it is recommended that the pipe be pulled to the surface and the ball removed there.

Spudding badly balled drill strings could conceivably place pressures of several thousand pounds per square inch in excess of hydrostatic pressure on the formation.

Annular space circulating pressures . . . Annular space circulating pressures are low in comparison to both surface circulating pressure and surge pressures. They seldom exceed 200 psi. unless gel strength of the mud is high or pumps are started rapidly to break circulation. Fig. 5 shows the circulating pressures in a typical well and illustrates the effect of opening the pumps rapidly to break circulation. This may give a momentary pressure increase of 200-300 psi. which does not occur when the pumps are opened slowly. The mud in this test had a relatively low gel strength but if the annular space mud had developed a strong gel the momentary pressure would have been greater. Circulation should be started slowly and the annular circulating pressure should be kept to a minimum through the use of well-conditioned muds of low viscosity and low yield value, which is equivalent to low gel strength.

Annular clearances . . . As drilling progresses and additional casing strings are set, annular clearances are reduced. The result is that spudding pressures, swabbing pressures, annular circulating pressures, and tendency to ball are increased. Drilling through 7-in. and smaller casing presents a particular problem in this respect.

It should be noted that rubber protectors are the biggest offender in this respect. They usually constitute the greatest restriction in the string, and when blowouts occur they have been known to swell to casing size from gas adsorption.

One of the best examples of the effect of small annular clearances occurred in drilling the 2 S. S. Perry at Peach Point. Both this well and the 1 Perry were principally drilled below the 7-in. casing with 3½-in. Hydril IF drill pipe equipped with rubber protectors which measured 5 in. o.d. installed. This gave an annular clearance of 0.638 in. between protectors and casing, or a circulating area of 11.30 sq. in. Between tool joints and casing there was 0.813 in. This pipe was changed for Reed 3½-in. Double Streamline pipe without protectors, which gave a clearance of 1.200 in., or 19.10 sq. in. This increased the tool-joint annular circulating area by 30.2 per cent, and comparing tool-joint clearance to protector clearance of the former pipe, the annular circulating area was increased by 69.0 per cent.

The amount of lost-circulation difficulties and balling decreased immediately following the change in pipe. Previous to the change gas was swabbed into the 17.3-lb. per gallon mud during trips, but after the change gas did not show, even though the mud density was reduced to 16.7 lb. per gal. Thus, the increased annular clearance saved 0.6 lb. per gallon of mud density.

Sloughing shale . . . The annular space may be closed off by sloughing shale. This frequently occurs in conjunction with salt-water flows and gas shows. Working the pipe helps to keep the condition cleared up, and during periods of combating these problems a close observation should be kept on the mud returns. If they slow or stop the mud pump pressure should be reduced or stopped until full circulation is possible. Stopping the pump and working the pipe may let the shale fall back and allow circulation to be resumed, but if the condition is ignored lost circulation will probably occur.

Excessive back pressure on choke . . . Another source of excessive pressure in wells is high back pressure when wells are on choke. Only enough pressure is required on the casing gage so that when added to the hydrostatic pressure of the gas or salt-water-cut mud column the total pressure is equal to formation pressure. This can be read directly if the well is closed in and the pumps stopped a moment, but this is practical only if the pipe is in the casing. As heavy mud is circulated the casing gage reading should not be allowed to exceed this value, and the casing pressure should be bled down as heavy mud is circulated to kill the well.

Drilling shallow sands too rapidly . . . Frequently lost circulation occurs in surface sands because they are drilled too rapidly. Annular velocities in the large holes drilled for conductor and surface pipe are low and sand and cuttings are removed slowly. The bit may be buried in unconsolidated sands that are not pumped away quickly and circulation may then be lost. Such formations can usually be drilled successfully by the use of increased viscosities and slower drilling.

Running casing rapidly . . . Annular clearances are smaller with casing than with drilling strings and the use of scratchers, which otherwise is of value, undoubtedly serves to increase the quantity of loose shale in the hole. This tends to close the annular space and cause formation breakdown. For these reasons slow running of casing is advisable in areas of likely circulation loss.

Primary cementing operations . . . Most of our wells are drilled with muds of less density than neat cement slurry. This makes it difficult to place long cement columns. Since excessive watering of neat slurry gives poor cement other techniques for lightening slurries are advisable. Lightweight slurries of satisfactory properties may be prepared through the use of high bentonite content or perlite slurries. Properly compounded, these may be watered to around 13.5 lb. per gallon and yet show adequate properties. In areas where adequate fillup is difficult to obtain these slurries are to be recommended.

Field Application

As a practical example of the use of the measures outlined, the experiences at Peach Point are mentioned. Three wells drilled in that area had a total of 79 losses of circulation. One well drilled by another operator had frequent and severe lost circulation. In two later wells annular clearances were increased. Oil-emulsion mud and controlled rates of penetration were used to help prevent balling. Spudding of pipe was eliminated and slow rates of running pipe initiated. These two wells were drilled to total depth with no loss.

While the measures listed will help to prevent excessive pressure buildup in wells they are by no means expected to prevent all lost circulation, and the remedial procedures need to be examined.

Early detection . . . The importance of early detection of the loss should be emphasized as this not only saves many barrels of expensive mud, but may save stuck pipe. It leaves mud which may be quickly loaded with sealing material for an attempt at sealing. If all the mud in the pit is lost before pumps are shut down then rig time is consumed while new mud is mixed.

Pit-level markers are seldom adequate, and if their use is depended upon much mud will usually be lost before the crew notices the loss of returns. Indicators of the type that can be read from the rig floor are much more valuable and easily pay for themselves in drilling where lost circulation is common. Good insurance tactics are to set the mud-pump suction high, and where pits are connected in series, to set the riser in the second pit high so that only the mud in the suction pit can be lost before the pump runs away.

Procedures when returns are lost . . . While it is sometimes possible in hard-rock drilling to leave the bit near bottom when returns are lost, this is dan-

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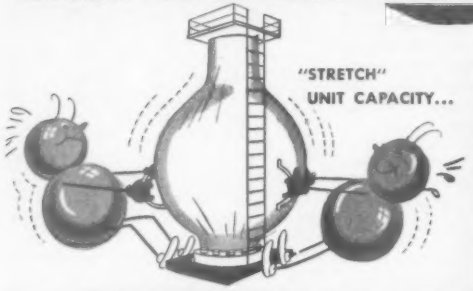

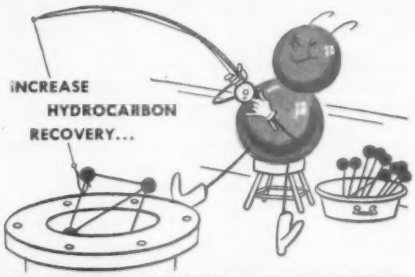

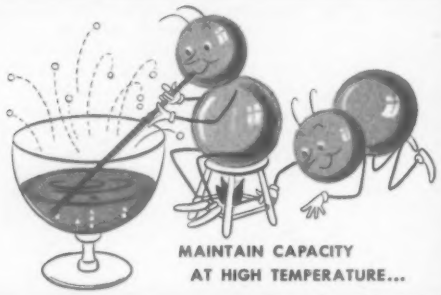

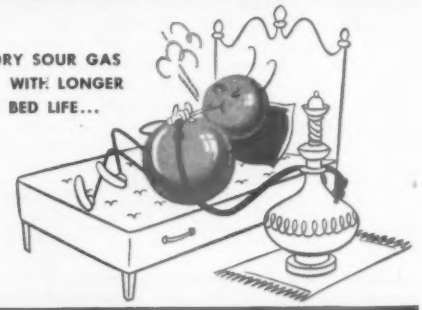

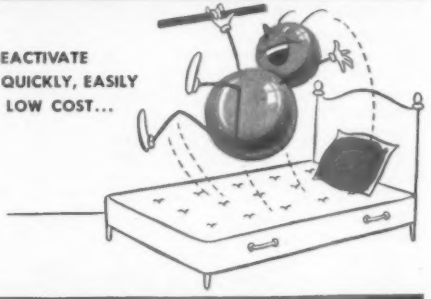

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gerous in shale areas as a falling mud column may cause shale to slough. Also, from the Spinner surveys already presented, it appears that the loss is more likely to be near the casing seat than at the bottom of the hole, and consequently more easily sealed from this point. Thus, pipe should be pulled to the casing when a loss occurs.

Regaining circulation . . . Circulation is often regained through the use of the common sealing materials, and since this is the cheapest, most easily used method of sealing losses it is usually tried first.

All or a good part of the mud in the pits should be heavily loaded with a mixture of sealing materials and this displaced through the bit. There is no adequate method for judging which of the common sealing materials are best, but it can be demonstrated on a laboratory basis that an even gradation of particle sizes seals more readily. Thus, a mixture of the common sealing materials is indicated. It may also be said that the larger the particles that are pumped the larger the opening that can be sealed. About 15 lb. of sealing material per barrel of mud is the highest concentration that can be conveniently pumped unless high specific gravity materials such as mica are used.

Batch pumping should be continued as described until returns are regained and if the loss is severe it may be practical to load the whole circulating system with sealing material and bypass the shale shaker for a while.

Howard and Scott[4] recently described a centrifugal separator which sorts cuttings from a mud loaded with sealing material, which should be of help when this situation arises.

Time factor . . . Time appears to favor the sealing off of losses, although its effects are not always predictable. Some operators make a practice of making a round trip after losses in shale drilling and report that they often find circulation possible after the trip. Sometimes it is true that difficulty is experienced in sealing a loss with a given mud density, but after the seal and later on in the drilling the mud density is increased with no loss. An attempt to test this effect was made in the 2 S. S. Perry well at Peach Point, where the well was pressure tested at intervals to determine what pressures, as read on the casing gage, were required to cause the formation to take mud. A loss had just occurred and the results were as follows:

Waiting period (hours)	0	1	2	4	8
Casing pressure at which formation took mud (psi.)	350	275	150	150	525

While the short waiting periods showed no improvement, the 8-hour interval did. The bit was run back to bottom and complete returns were established. It would be convenient if the practice were reliable, but unfortunately, it cannot always be depended upon. Further data on this effect are needed. Sometimes balling or sloughing shale cause a loss and when the condition is removed circulation is again normal without any effort being made to seal the loss.

Pressure conditioning formations . . . Often the use of sealing material fails to regain circulation and it becomes necessary to resort to other methods. The most difficult Gulf Coast lost-circulation problem arises when a loss zone must be pressure conditioned. This too, requires methods other than the simple circulation of sealing material. This problem usually occurs when a well loses circulation at a given mud density and it is not planned to set casing before penetrating zones which require an increase in mud density. Not only must circulation be regained but the well must be made to withstand the anticipated high mud density before the high-pressure zone is penetrated.

Locating point of loss . . . If methods other than the circulation of sealing materials are to be employed the point of loss should be located. These measures require the squeezing of highly viscous materials or cement into the loss zone, and this should be done from above and near the point of loss.

In penetrating cap rock, or if the bit and drill collars are badly balled, it may be assumed that the loss is at or near bottom, otherwise one of several instruments should be used to locate the point.

The most commonly used instrument is the Spinner (Dowell). This instrument is run into the well on a conductor cable and it has a bladed rotor which turns in flowing fluids. Revolutions of the rotor make and break an electrical circuit and this is registered in a truck at the surface. While mud is pumped in at the surface, various points in the hole are checked for mud flow, and the depth where it ceases is the point of loss. A sharp decrease in mud flow above the point shows an additional point of loss.

The chief disadvantage of this instrument has been its tendency to clog up from sealing materials and shale particles in the hole, but it has been used to locate the point of loss to within 1-ft. intervals. Normally, to save time and mud it is only necessary to locate the loss to within a 20 to 30-ft. zone.

An instrument ("Hot Wire Tool"; Dowell) which has proved itself in muds heavily loaded with sealing material makes use of the change in resistance of a heated resistor as it is cooled by mud flow. This device is run on a conductor cable and is used in the same manner as the spinner. A high-voltage drop across the resistor indicates that it is not being cooled by mud flow, and when it is brought into the zone of moving fluid the resistor cools and the voltage drop decreases. It was used successfully in West Texas in first trials and will soon be available in the Gulf Coast area.

Squeezing techniques . . . Once the zone of loss has been located, one of several squeezing techniques may be tried to seal it off. All of these are successful on occasion, but frequently, repeated attempts are necessary before the formation can be made to withstand high mud densities The reason for this is possibly that the original fracture is sealed but additional fracturing occurs in the immediate vicinity of the loss. If the zone was weak enough to fracture at one point, then pressures equal to or greater than the original fracturing pressure would be expected to cause adjacent zones to break down.

Such a weak zone is indicated in the losses at Bully Camp shown in Table 1. At intervals of 7 and 15 days the well lost circulation at 4,470-71 ft., 4,473-74 ft., and 4,479-80 ft.

Sealing-material squeezes . . . The sealing-material squeeze is the easiest and most economical of the squeeze techniques to apply. It involves pumping a batch of thick mud very heavily loaded with sealing material (about 30 to 40 lb. per barrel if chiefly mica is used) to the bit, closing the well in, and slowly squeezing the mixture into the point of loss. As soon as an adequate pressure buildup occurs, the pumping is stopped and pressure held on the hole for several hours before reaming out. This method has its greatest application where losses are not severe and large increases in mud density are not anticipated.

Sodium silicate-fresh water mud squeeze . . . This technique has sometimes been successful in squeezing off the most severe losses. It utilizes the ability of sodium silicate to cause high-solids fresh-water muds to set to a thick, putty-like consistency.

From 100 to 200 bbl. of fresh water mud, usually containing 50 lb. of a high yield clay per barrel, are caused to mix below the bit or open-ended pipe with either "D" or "N" brand sodium silicate in the ratio of 10 to 20 bbl. of mud to 1 of sodium silicate.

The fresh-water mud may contain sealing material. This mixture is squeezed into the point of loss until a suitable pressure buildup is obtained, or until the pressure begins to drop back, at which time the pressure is then held for 3 hours before circulating and reaming.

The method of accomplishing this mixing varies, depending upon the mud in use in the well. If sodium silicate mud is being used the fresh water mud is pumped down the drill pipe, and annular-space pumping provides the necessary sodium silicate. If fresh-water mud is in use then the sodium silicate is displaced down the pipe and the fresh-water mud is obtained by annular-space pumping. If a lime mud is used, then both the fresh water mud and silicate are pumped down the drill pipe in alternate slugs of 2 bbl. sodium silicate and 40 bbl. of fresh-water mud, mixing being accomplished by turbulence as the slugs are pumped down the hole. Some jobs have been made with sodium silicate mixed from below the bit into the lime-treated mud, but the seals did not hold.

Still another variation of this squeeze has been the use of lime-treated mud mixed into fresh-water mud in a ratio of 1 to 40.

With all these squeeze techniques cementing trucks are utilized because of their ability to pump high pressures, viscous mud, and to make accurate volume displacements. One to two barrels of water are used to separate each different material pumped down the drill pipe to prevent mixing and plugging before the mixture leaves the pipe.

Silicate squeezes usually are made from 100 to 500 ft. above the point of loss to insure adequate mixing of the mixture, and of course, are most safely made from casing if this is near the point of loss.

These methods cost about $3,000 per job for materials and rig time, but have often been the only apparent solution to difficult situations.

Cement squeezes . . . Table 1 shows three jobs where the mud loss was at the casing seat. This indicates a poor cement job, and squeezing with cement is the best remedial procedure. Cement squeezes may also be used where losses are not far below the casing seat so that cement may be readily displaced from the packer to the point of loss. However, they have proved to be no more effective than other squeeze methods for sealing losses, and tend to cause later difficulties. In soft shales the hole may be sidetracked when the zone is reamed and there is danger of chunks of cement breaking from the hole and sticking pipe. The use of high-gel-content cement mixed at 13 to 13.5 lb. per gallon gives adequate but relatively weaker cements than neat slurries and their use should help in these respects.

Bentonite-diesel oil squeeze . . . The use of a bentonite in diesel-oil suspension as a squeeze mixture is a recent development. (The patent application covering the method is assigned to Gulf Oil Corp.) It has worked very well on some occasions but its use has not yet been extensive enough for complete evaluation. Its cost is about one-half that of a silicate squeeze.

Two cementing trucks are used. Twenty barrels of diesel oil-bentonite suspension containing 350 lb. of bentonite and 15 lb. of sealing material per barrel of oil are mixed in the measuring tanks of each truck. This is displaced to the bit with a barrel or so of clean oil ahead of and behind the mixture and the well closed in. Pumping on both the pipe and annular space is so done that 1 bbl. of mud is mixed with 4 bbl. of suspension as it leaves the bit. Pumping is continued until all but 2 or 3 bbl. of the mixture is displaced into the zone of loss. When the mixing occurs the bentonite hydrates, first forming a lumpy mixture and then solidifying as it contacts additional mud. The mixing ratio is short of that required for maximum strength. Consequently, after the mixture is squeezed into the loss zone and reamed out it is believed that additional mud or filtrate entering the zone serves to further hydrate and harden the bentonite. The final pressure is usually held for an hour or so before reaming out. The cuttings and bit weight required for reaming indicate that a hard mixture is formed.

"Are you sure those new men you hired are experienced in this type of drilling?"

Time setting clay cement . . . McNiel and Messenger[7] recently described a time-setting clay cement. The use of the material involves mixing a special clay with aluminum silicate and a retarder in an aqueous suspension and displacing this mixture into the zone of loss. This sets to a plastic-like material after a short period. The authors gave a number of instances in which the method had sealed off losses and it will be interesting to follow its further application in the Gulf Coast in pressure conditioning applications and in high-density muds.

Pressure testing . . . The usual method of testing a zone after a loss is sealed is to impose a pressure on the closed-in well equal to the difference in hydrostatic pressure of the mud being used and that of a desired high density mud. If the well takes mud additional sealing is necessary. Some operators gamble on the time factor improving the seal in a zone and do not pressure test after a loss. This effect may be utilized if there is considerable drilling remaining before increased mud density is required. However, the mud density must be raised to the required value well before the high pressure zone is penetrated. Delayed pressure testing becomes dangerous in exploratory drilling when high pressures are encountered unexpectedly.

Acknowledgment

Recognition is made of the efforts of A. J. Teplitz of Gulf Research & Development Co., and D. D. Dawson, Jr., J. L. Burba, Jr., J. P. Weichert, and W. F. Rogers, all of Gulf Oil Corp. This paper is based on work done by this group and the author.

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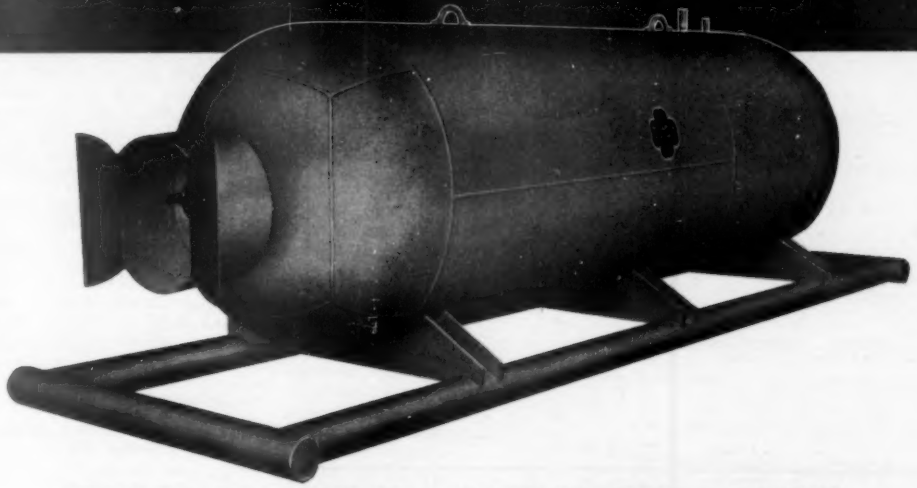

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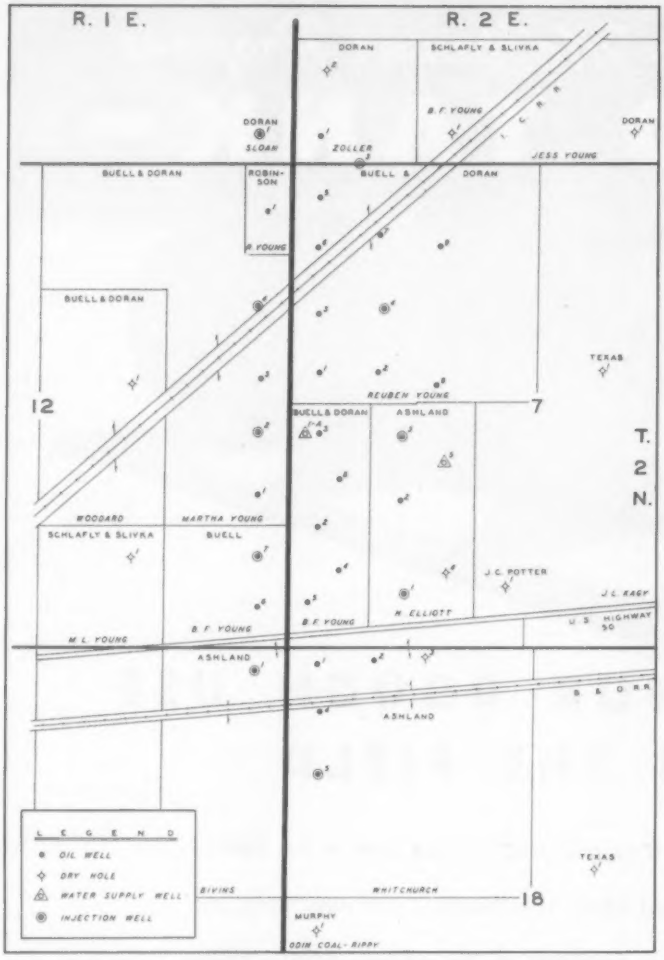


FROM LESS THAN 100 BBL. TO OVER 1,200 BBL. DAILY, IS RECORD OF

Odin Water-Flood Project, Marion County, Illinois

by Leon Krause
Water flood engineer, Ashland Oil & Refining Co.

THE Odin water-flood project is located near Salem, Marion County, Illinois, Sections 12 and 13-2n-1e, and Sections 6, 7, and 18-2n-2e.

Primary Production History

Original development . . . Odin field was discovered in May 1945 with the completion of Buell & Doran's 1 Martha Young. There was a total of 22 producing wells drilled by the end of December 1945, and peak production of 545 bbl. daily also was reached in that month. There were three additional producers drilled in the northwest corner of the field in June 1948, resulting in 25 Cypress wells. Drilling was done on a normal 10-acre spacing pattern.

TABULATION OF PRIMARY PRODUCTION—BARRELS

Date—	Producing wells	Gross prod.	Cumulative prod.
1945	22	84,442	84,442
1946	22	134,571	219,013
1947	22	73,103	292,116
1948	25	51,973	344,089
1949*	25	36,647	280,736

*To December 1, 1949.

TABULATION OF DAILY AVERAGE PRODUCTION

Date—	Daily average bbl.
December 1945	545
December 1946	260
December 1947	165
December 1948	122
November 1949	92

The crude was produced predominately by the expansion of dissolved natural gas. The decline curve for the Ashland-Whitchurch lease showed evidence of the partially effective natural water encroachment but was of such small magnitude that the over-all effect was negligible. Subsequent drilling established the oil-water contact at a subsea depth of 1,240 ft.

SUCCESSFUL WATER FLOOD!

Pay Formation	**Cypress sand**
Depth	**1,750 ft.**
Oil Producers	**22 wells**
Well Spacing	**10 acres**
Pilot Flood	**September 1949**
Full-Scale Flood	**October 1950**
Water Input	**10 wells**
Flood Pattern	**Peripheral**
Water Source	**Tar Springs**
Water Supply	**2 wells**
Oil Before Flood	**92 bbl./day**
Peak Production	**1,192 bbl./day**
Water Injected	**817,295 bbl.**
Additional Oil	**447,143 bbl.**
Future Reserves	**497,857 bbl.**

With the reservoir operating on gas expansion, the rate of decline was relatively rapid.

Reservoir Characteristics

The producing horizon in Odin field is the Cypress sand, lying immediately below the Barlow lime. Locally the pay is often referred to as the Odin sand. Average depth to the Cypress is 1,750 ft.

The reservoir is an elliptical stratigraphic trap with a permeability pinchout on the west, north, and east. There is a transition from an oil-saturated section to water in the south direction. The oil-water contact was established at an approximate subsea depth of 1,240 ft.

The productive area in the field, planimetered from the isopachous map, was determined to be 365 acres with an average thickness of 11 ft. The total reservoir volume is approximately 4,000 acre-ft. Original oil in place was estimated to be 4,000,000 bbl.

Cores and crude oil . . . The physical properties of the sand areas follow:

Average permeability, md.	80
Average porosity, per cent	19.75
Connate water saturation, per cent	33
Rel. perm. at resid. sat., per cent	13.5

Physical properties of the crude:

Gravity, °A.P.I.	38
Viscosity, cp. at res. temp.	8
Gas in solution est., cu. ft. per bbl.	30
Original b.h.p. est., psi.	700

Secondary-Recovery Program

The decline in production inspired an investigation of the water-flooding possibilities of Odin field. The results of an engineering study revealed a large secondary reserve. Several injection patterns were given consideration and a decision was reached to adopt the external or peripheral type. Plans included provisions for an experimental or pilot flood.

Pilot flood . . . Prior to the commencement of the full-scale flooding program a pilot test was conducted in order to determine the reaction of the Cypress sand to flooding. A decision was made to convert the Ashland 1 H. Elliott to an input and observe the results on the offset wells.

The Buell & Doran 6 R. Young was drilled to the Cypress, a temporary plug was set, the casing opposite the Tar Springs formation was perforated, and the well was equipped as a temporary water supply. An analysis of the Tar Springs brine indicated that no chemical treatment was necessary, but provisions were made to introduce a sequestering agent in the form of complex metaphosphates to hold the mineral matter in solution, and a temporary aloxite tube filter was installed in the line to remove impurities.

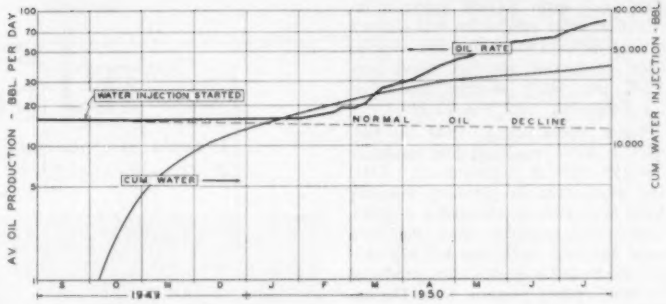


FIG. 1—PILOT TEST—Wells Nos. 1 and 2, Whitchurch lease. Normal decline and actual production.

Pumping equipment was removed from the Ashland 1 H. Elliott, the well was cleaned out, and readied for injection. Water injection was started on September 29, 1949.

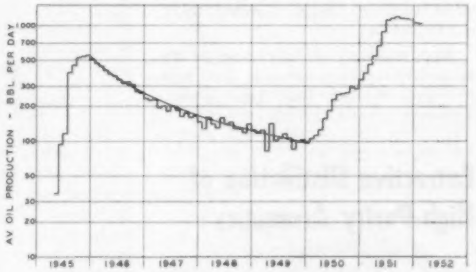


FIG. 2—PRODUCTION—Oil rate for entire project.

INPUT-WELL HISTORY (PILOT FLOOD)

Date—	Daily average (bbl.)	Cumulative (bbl.)	Surface pressure (psi.)
October 15, 1949	133	2,126	0
October 31, 1949	163	4,742	10
November 15, 1949	139	6,820	10
November 30, 1949	150	9,071	10
December 15, 1949	145	11,250	15
December 31, 1949	164	13,877	20
January 31, 1950	141	17,823	70
February 28, 1950	177	22,776	70
March 31, 1950	115	26,338	70
April 30, 1950	138	30,488	70
May 31, 1950	49	31,998	35
June 30, 1950	126	35,789	100
July 31, 1950	104	38,997	100

Injection was continued in the pilot test to March 31, 1951, at which time daily production was 29 bbl.

Unitization of Field

The peripheral-type injection pattern could be used on condition that the field was unitized. Participation factors in the unit were based on daily production and reservoir volume.

Full-scale flooding . . . The development for this required the drilling of two inputs, five producers, and two water-supply wells, and the conversion of eight present producers to inputs.

Water Supply and Treatment

The water bearing Tar Springs formation, at a depth ranging from 1,500-1,600 ft. and with a thickness from 50-75 ft., blankets the field. The water-supply wells were drilled through the formation with rotary tools and 5½-in. casing set and cemented below the water sand. Casing opposite the Tar Springs was perforated with four shots per foot. Static fluid level was 250 ft. from the surface.

The pressure plant uses a closed system. The water supply wells pump the brine into the 1,000-bbl. wooden raw-water tank in which an oil seal is maintained to prevent the exposure of the water to the atmosphere. A centrifugal circulating pump is connected to the raw-water tank and moves the brine from the supply tank through a rapid sand filter into two 1,000-bbl. wooden clear-water tanks. Oil seals are also maintained in the clear-water tanks. Predetermined water levels are maintained in all tanks by liquid-level controllers which activate the units on the water-supply wells and the circulating pump.

Water is taken from the clear-water tank by an electrically driven 1¾ by 4-in. vertical triplex pump and discharged into the main line.

Water-flood performance . . . The pilot flood was started on September 29, 1949, and when the results of the experiment were considered successful,

plans were made for the full-scale installation. Peak production was reached in September 1951 when the average daily production for the month was 1,192 bbl. Daily average production for November 1949 was 92 bbl.

From December 1, 1949, to January 1, 1952, the field had produced 384,253 bbl. or approximately 3,500 bbl. more than the primary recovery from May 1945 to December 1, 1949. Cumulative recovery from the field as of March 1, 1952, was 827,879 bbl., of which 447,143 bbl. was produced by the flooding program from December 1, 1949, to March 1, 1952. Primary and secondary performance is shown graphically on Fig. 2. Cumulative water injected to March 1, 1952, is 817,295 bbl.

Approximately 47 per cent of the secondary-recovery estimate has been produced to date, and there remains a reserve of 497,857 bbl.

Extractive Distillation of High-Purity Aromatics

(Continued from page 70)

phenol, and that subsequent drying, but no redistillation, is required to meet all the nitration specifications.

Nitration-grade specifications for toluene and xylenes recovered by extractive distillation from naphthene-dehydrogenation concentrate may be attained by a relatively simple treatment with maleic anhydride followed by caustic and water wash. Again, redistillation is not required. Treating losses are insignificant in these cases. As olefinicity of the concentrate increases, it becomes necessary to resort to mild sulfuric-acid treatment followed by caustic neutralization, water wash, and subsequent distillation to separate polymers. Four pounds of 98 per cent sulfuric acid per barrel was found to be sufficient for most toluene recovered from hydroformates. In the case of thermally cracked and thermally reformed naphthas, acid requirements increase (up to 20 lb. of 98 per cent sulfuric acid per barrel of aromatic), and losses become correspondingly greater.

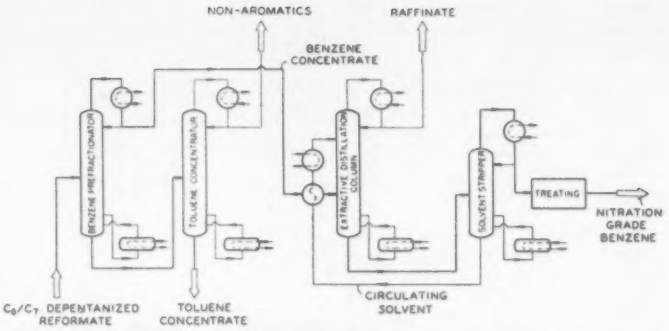


Fig. 4—Shell aromatics recovery process—nitration-grade benzene and aromatics blending stock.

Recovery of Aromatics

The extractive distillation process can be used for recovery of benzene, toluene, or xylenes. One Shell plant, designed expressly for recovering toluene from dehydrogenated straightrun naphthas, periodically changes from benzene to toluene to mixed xylenes, depending upon the marketing requirements of the company. This plant has used mixed cresylic acids (200° to 220° C.) as solvent for all three aromatics. This solvent has a boiling point sufficiently high to be used for xylene recovery; however, it is not quite so selective as phenol which is recommended for both benzene and toluene recovery.

Because of the stringent requirements for purity, it is recommended that separate distillation columns be installed for each aromatic desired in nitration-grade quality. In the case of smaller-capacity units, the concentrates may be processed in blocked-out operation through a single extractive distillation section. However, it is possible rather simply to produce a single nitration-quality aromatic while an aromatic-rich concentrate is being made when the feed has a high concentration of aromatics.

Fig. 4 is a simplified flow diagram which illustrates the recovery of nitration-grade benzene from the stabilized product of Platforming a 60° to 110° C. East Texas-West Texas naphtha, while simultaneously an aromatic-rich concentrate is recovered for use as a blending component in aviation gasoline (material balance, Table 9). By the addition of a column to reject non-aromatics which boil between benzene and toluene, it is possible to produce an aviation blending stock which contains about 97 per cent aromatics, with an F-3 blending octane number (18 per cent blend in isopentane and alkylate) of 103 upon addition of 4.6 ml. TEL per gallon, and an F-4 blending index number of 228 upon addition of 4.6 ml. TEL per gallon. Attainment of these octane levels depends upon adjustment of the composition of the feed to the Platforming unit so as to exclude components which boil above toluene, and in the adjustment of the severity of Platforming.

Acknowledgment

The authors gratefully acknowledge the efforts of the technical staffs of Shell Development Co. and Shell Oil Co., upon whose work this report is based. Acknowledgment is given W. L. Snider and A. E. Handlos for assistance in the preparation of this paper.

TABLE 9—MATERIAL BALANCE (SOLVENT-FREE BASIS)

(Nitration-grade benzene and aromatic aviation blending stock from depentanized naphtha from Platforming an East Texas-West Texas C_6-C_7 fraction)

	Feed			Top product			Bottom product		
	Bbl. per stream day	Per cent by vol. of benzene	Per cent by volume of higher aromatics	Bbl. per stream day	Per cent by vol. of benzene	Per cent by volume of higher aromatics	Bbl. per stream day	Per cent by vol. of benzene	Per cent by volume of higher aromatics
Benzene concentration	9,000	14.2	31.0	4,554	27.5	0.02	4,446	0.6	62.7
Extractive distillation	4,554	27.5	0.02	3,321	0.9	0.00	1,233	99.2	0.1
Solvent stripping	1,233	99.2	0.1	1,233	99.2	0.1	.....	Solvent	.....
Redistillation*	1,233	99.2	0.1	1,221	99.5	0.1	12	...	...
Toluene concentration	4,446	0.6	62.7	1,656	1.6	5.1	2,790	...	97.0

*After acid treatment and caustic wash. Note: Recovery of nitration-grade benzene = 95.4 per cent.

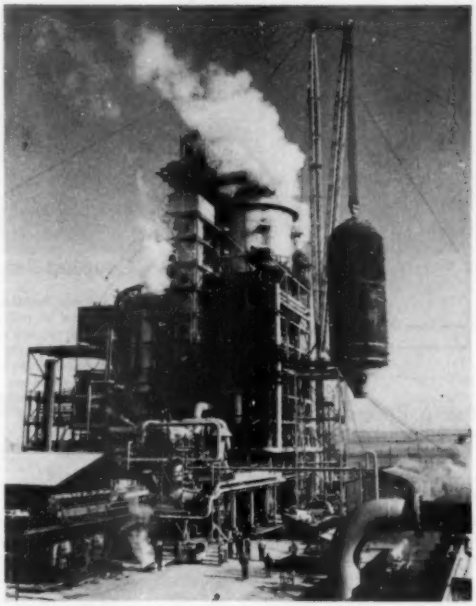
Operation "Big Lift"

Shell replaces 194-ton reactor during eleventh turnaround of cat cracker at Wilmington, Calif.

THE highlight of the recent turnaround of Shell Oil Co.'s 14-story catalytic cracking unit at Wilmington, Calif., was "operation big lift" — replacement of the unit's 194-ton reactor.

In the eleventh turnaround of the unit since it went on stream in 1943, the reactor was removed in two sections, the top weighing 150 tons, and the bottom weighing 50 tons.

The new reactor is 24 ft. i.d., 92 ft. high including standpipe, and contains six cyclones mounted below the plenum chamber with individual dip legs.



"BIG LIFT" operation in turnaround of Shell's cat cracker at Wilmington, Calif., was the replacement on the 194-ton reactor. Here the new one is being moved into position.

X-rays taken . . . The reactor was X-rayed completely, Cobalt 60 being used as the radioactive material for field radiographs. Since a large number of welds were involved, it was decided to develop the pictures on the job site, which saved considerable time.

How it was installed . . . Contractors used a 200-ton guy derrick with an 180-ft. mast mounted on a 65-ft. platform tower, rising 40 ft. higher than the top of the cracking unit, for installation of the new reactor. Securing the platform tower required foundation pilings and 10 guy lines.

Average horizontal span of the guy lines from the deadmen to the derrick was 710 ft.

Shell estimates that close to 70,000 company manhours were required to complete the turnaround, which included replacement of equipment, cleaning, inspection, and general repair.

Reducing Corrosion

Inhibitor effective on vertical turbine pumps

CORROSION of shafts and columns in deep-well vertical-turbine pumps long have been recognized as a major problem in water production. Attempts to control the corrosion by means of cathodic protection or protective coatings have met with indifferent success.

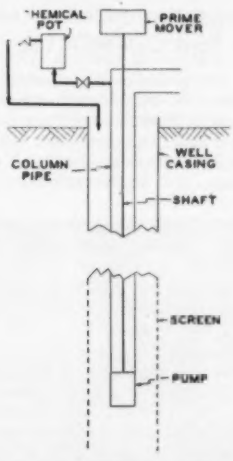
A schematic diagram of a well containing a vertical turbine pump is shown here. Briefly it consists of a screened casing into which ground water flows. The pump sets near the bottom of the well and is driven by a prime mover at the surface through a shaft.

The pump takes suction from the annular space between the casing and the column and discharges into the annular space between the shaft and the column. The shaft may or may not be cased. The bulk of the corrosion occurs on the inside of the column and the surface of the shaft and has been shown to be a function of the velocity of the water in the shaft.

Test well . . . The well used for test purposes is 160 ft. deep with 60 ft. of screen and with the pump set at 100 ft. It pumps 400-500 g.p.m. of water having the following composition:

	ppm
Calcium	100
Magnesium	12
Chlorides	42
Sulfates	1
Bicarbonates	425
pH	7.1
Color	7

Normally, water of this chemical composition would not be considered aggressive at a temperature of 60° F., but it was found that the column and shaft life in the well was only about 12 months.

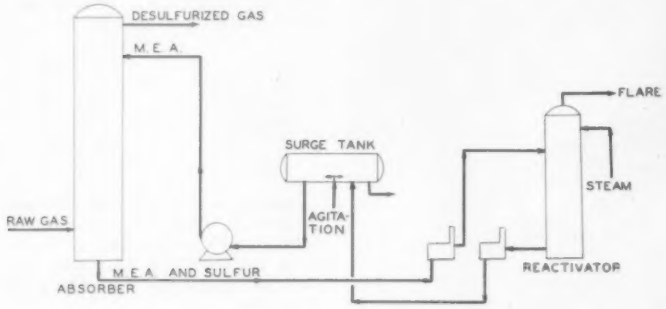


Selecting an inhibitor . . . When it was decided to try chemical treatment, the selection of inhibitors was limited by the fact that the water was used both for domestic and industrial purposes. The agent selected was one of the glassy molecularly dehydrated sodium phosphates applied in threshold concentrations.

The feeding device consists of standard ball feeder which will hold a day's supply of phosphate. Water from the discharge of the well flows through a ¾-in. pipe into the bottom of the pot dissolving the phosphate. The phosphate solution flows from near the top of the pot through a ¾-in. line into the annular space between the casing and the

column. The feed rate is adjusted by the outlet valve to maintain a ¾-p.p.m. phosphate concentration in the pump discharge.

A 500 g.p.m well will require from 18 to 20 lb. of chemical daily. At a cost of 15 cents per pound, the annual cost will be in the range of $1,000. Although this figure may seem high, it represents a considerable saving over an annual replacement of the shaft and column.



Gas Agitation on Bottom of Surge Tank Cuts MEA Use

The introduction of gas agitation into the bottom of the monoethanolamine surge tank at Plymouth Oil Co.'s Benedum field natural-gasoline plant in Upton County, Texas, has cut down tremendously on the consumption of M.E.A.

The innovation, which was made by Clarence C. Hickle, plant superintendent, reduced consumption of M.E.A. from 57,500 lb. to 12,415 lb. in two 7-month periods, one preceding and one following the change.

In processing gas through an M.E.A. unit, the sulfur contained in the gas is picked up by the M.E.A. contained in the absorber. The M.E.A. is then reactivated by heating and steam distillation, and is stored in a surge tank from which the uncontaminated M.E.A. is pumped to the absorber. Any M.E.A. containing sulfur settles to the bottom of the surge tank and is drained off.

During the early months of operation, Hickle noted that large quantities of M.E.A. had to be disposed of from the tank because sulfur was still contained in solution. To offset this, he placed a small nozzle, about 8 in. high, in the bottom of the tank and introduced desulfurized gas into the accumulation of contaminated M.E.A. in the bottom of the tank.

The resultant agitation caused more of the sulfur to break loose from the M.E.A. and effected the considerable savings noted previously.

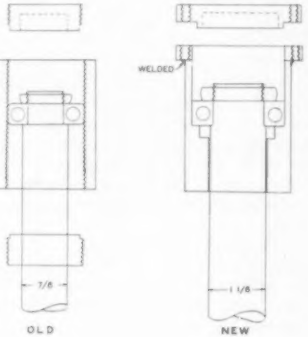
Pump Redesigned, Rebuilt To Eliminate Breakdowns

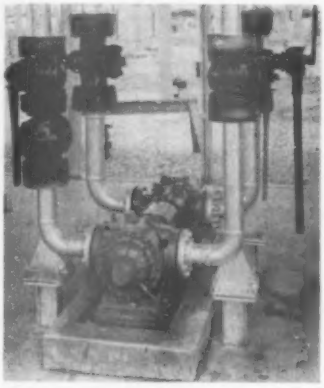
Frequent shutdowns were being experienced with a phenolic water pump due to a weak bearing system and broken pump shafts at Sinclair Refining Co.'s Houston plant.

The pump performed its required function when in operation but performance was undependable due to the two weak units.

The decision was made to increase the size of the shaft and install larger bearings using a fast coupling. The modification resulted in an over-all average increase in moving parts—shaft and bearings—of about ¼ in.

The altered design saved the cost of a new pump and has resulted in the performance which would have been expected from a new unit.





Coupled Rotary Pumps

At Warren Petroleum Corp.'s Ringwood gasoline plant 50 miles west of Enid, Okla., two rotary pumps are coupled together, with rich oil from the main absorber passing through the primary pump, driving the second pump. The second pump circulates lean absorption oil to the reabsorber. This gasoline plant just recently went on stream.

THIS ASH RECEIVER was designed by R. B. McLaughlin, superintendent for Northern Natural Gas Co., Sublette, Kans., from 8-in. pipe, spot-welded to pipe support. Otto Barbe, assistant superintendent, "demonstrates" its use.

"On the Job"—in the plants and in the fields, is designed especially for YOU! It offers ideas on how to make your work more efficient, and offers money savers, time savers, and labor savers.

If you've a suggestion which fills the bill, drop us a line. Mail to Editor, "On the Job," The Oil and Gas Journal, Box 1260, Tulsa, Okla. All photographs and manuscripts will be returned if requested.

WATER COLLECTS in central filter unit and gathering tank, is pumped down casing of disposal well (right).

Salt-Water Disposal

Brown Oil Co. disposes of 150 bbl. daily by pumping water to old abandoned dry hole a mile from oil field

A DAILY salt-water production of 150 bbl. posed a disposal problem for Herman & George R. Brown Oil Co. in Buenos field, Garza County, Texas, since no shallow disposal sands were available.

However, J. E. Teddlie, Jr., of that company reports that the problem was solved by pumping the water to an abandoned San Andres lime dry hole 1 mile from the field. The 7-in. casing in the disposal well has never been pulled.

In constant operation, three lease heater treaters feed the salt water by gravity to a central filter unit and gathering tank, from which the water is pumped down the casing of the disposal well.

Automatic . . . The entire operation is automatically controlled by a float switch in the gathering tank and pressure dump valves on the treaters. As all lines are sealed and an oil cap is maintained on the gathering tank, the San Andres salt water is pumped to the surface with the oil, separated, filtered, and returned to the San Andres disposal well without ever coming in contact with air. As a result chemical breakdown is largely retarded.

Useful mechanical aids in this operation are the freeze-proof float linkage in the gathering tank (which controls the salt-water centrifugal pump), the settling tube at the disposal well, and the acidizing system at the disposal well. The settling tube consists of a 14-ft. section of 10¾-in. casing with suitable openings. The acidizing system was a result of a need periodically to scour the open hole of the disposal well.

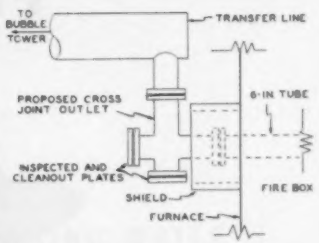
Treating . . . The problem of economically transporting and maintaining a supply of 30 per cent hydrochloric acid was solved by using a coated 55-gal. drum. The inside of the barrel and its removable top were sprayed with a rubber-base auto undercoat. Then, the top was sealed on with the top ring, and a brass valve was brazed near the bottom of the barrel.

Acid is periodically dumped into a 5-gal. well-head container made of 10¾-in. orange-peel welded pipe. Proper manipulation of the well-head valves allow the disposal water to carry the acid to the disposal section in the limestone at 3,500 ft.

At present, this 90 ft. of open-hole lime formation has absorbed 22,000 bbl. of salt water under gravity conditions.

New-Type Outlet Bends For Vacuum Still Furnace

In the course of cleaning and servicing the fired coil on a vacuum pipe still, it was necessary to move the outlet



bends to permit cleaning and inspection of the outlet tube and the transfer line.

The outlet bends were originally constructed from standard type elbows and during the servicing operation, these large elbows had to be removed.

To facilitate and simplify the cleaning procedure, a special fitting was devised to replace the elbows. (see sketch). The fitting is similar to a cross-tee, with two of its openings extended to tie-in with the transfer line and outlet tube. The other two openings are blanked off with steel plates during normal operations.

When cleaning and servicing are to be done, access to the tube and transfer line may be made quickly and easily by removing the clean-out plates.

The method was suggested by Joseph G. Aucoin, of Esso Standard Oil Co., Baton Rouge, La.

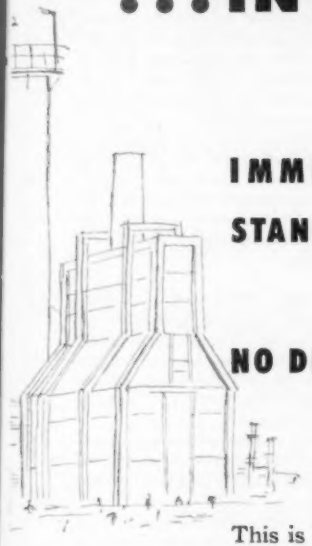
Reversible Air-Impact Wrench Speeds Work

A reversible air-impact wrench is used by Shell Oil Co. in Helen Gohlke field, Texas Gulf Coast, for making up and breaking out nuts on pumps and blowout preventers *(See photo above)*.

The wrench will handle bolt sizes

FROM FILE TO FIELD

. . . IN ONE STEP



IMMEDIATE ERECTION OF STANDARD A, B, and C * PLATFORMING UNITS

NO DELAYS . . . NO WAITING FOR DESIGN DRAWINGS

This is big news for the refiner who needs Platforming . . . and in a hurry!

Procon can erect Platforming units of * 600, 1000, and 1500 barrel per day design capacities from drawings already on file. This means no time out for detail design—no extended interval between contract and construction.

Actual capacities of these Standard units will vary according to refiner's feed stocks and method of operation, but the range of sizes permits the refiner to choose the capacity best suited to his individual requirement.

This file-to-field service is the answer to fast, economical construction and enables the refiner to take the shortest route to profitable on-stream production with the widely accepted Platforming process.

PROCON

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PROCESS CONSTRUCTION

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up to 1¼-in. Weighing only 32 lb., it can easily be handled by one man, and is equipped with a pistol-grip handle.

The time for removing and replacing all valve-pot caps and cylinder heads for an eight-pot mud pump has been reduced by approximately 2 hours through use of the wrench.

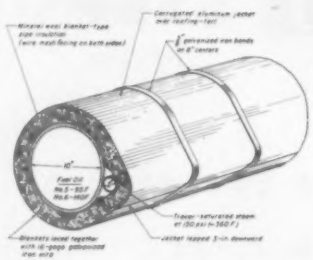
The air-operated wrench, when used around a rig, results in reduction of fatigue, freeing manpower for other duties.

Blanket Type Insulation Used on Steam-Traced Lines

General American Tank Storage Terminal at Argo, Ill., uses blanket-type pipe insulation on two steam-traced fuel-oil lines which carry heavy fuel oil from the manifold pit to storage tanks.

The two 10-in. lines are insulated with mineral wool and traced by parallel 2-in. steam pipes to prevent temperature drop in No. 5 and No. 6 oils, which are kept at 95° F. and 140° F., respectively.

Maintenance of higher oil temperatures insures low viscosity and facilitates pumping and handling in transit.



Mineral-wool blanket sections 24-in. long and 2-in. thick, with wire-mesh facing on both sides, are wrapped around the two pipes and laced together with 16-gage galvanized metal wire. A 28-gage corrugated aluminum jacket, with an asphalt-felt weatherproof liner applied to its inner surface, is then wrapped around the blankets.

The jacket is lapped down 2 to 3 in. against the weather to prevent moisture entry, and banded with ⅝-in. galvanized metal bands on about 8-in. centers.

All details of the application appear in the diagram (courtesy of Industrial Mineral Wool Institute), which also shows how the insulation adapts itself to the contours of the adjoining pipes.

Breaking in a new man?

Here are some suggestions which may help you

HERE are a few suggestions which may aid in training a new drilling crewman, as outlined before a recent drilling-industry safety clinic by J. E. James, training representative in the Houston area for Shell Oil Co. (The clinics are sponsored by American Association of Oilwell Drilling Contractors):

First . . . proper breaking-in makes a more efficient and reliable crew and pays dividends in more interested crewmen, increased safety, and decreased manpower turnover.

New methods . . . contrast with the instructions given in the early days, which usually consisted of: "Grab ahold of that iron—if you hold its head it won't bite you—we've got a hole to make!"

It is recognized that more permanent help is obtained by giving the applicants as much information as possible in the start. A factual, honest story of drilling work may discourage some would-be employes, but those who accept the job are likely to be more willing and permanent help.

It has also been proved that poor indoctrination may cause a chain reaction of extra expenses, for frequently a poorly taught roughneck must unlearn a set of work habits he has already developed, and if he hunts another job because he is not satisfied, labor-turnover costs increase.

Four steps made up the teaching principles, which are on-the-job instruction, with the driller as the instructor:

1. Prepare the learner's mind . . . An introduction to other crew members is a start. The driller tells about the operation of various pieces of rig machinery, amount of hole this crew makes and the kind of safety record the rig has established. The feeling of being needed creates an initial favorable mind for receiving learning.

New men would benefit if given a copy of "A Primer of Oil Well Drilling," available from the University of Texas, division of extension.

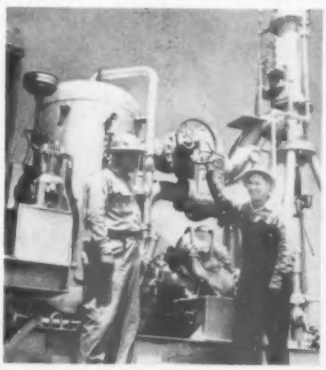
2. Show or demonstrate . . . Each of the rig-floor operations are actually demonstrated. For example, tongs are latched and unlatched several times with a verbal explanation of each move. Emphasis should be placed on various ways tongs might cause injury.

3. Let the learner do it . . . Operating procedure should be gone through again, letting the new crewman try the operation several times so that the driller can see if he has learned the correct and safe way.

4. Follow-up . . . Final step is to observe the man in actual work performance on his own. The instructor must not assume the man knows, but by observation he will know the learner has the knowledge to do and is doing his work correctly.

According to James, such indoctrination training should provide job knowledge, develop job skill and create proper attitudes.

How the trained man feels about the job is more important than anything else. Even though he has the job knowledge and skill, he will not remain a crewman if the training has not created a good attitude, and a man's production is determined by his attitude rather than by his skill.



Deep Pumper

Carl Martin, left, head roustabout, and Bill Miller, pumper for Sunray Oil Corp., make an adjustment on a hydraulic pumping unit on the company's multizone lease at Newhall-Potrero, Calif. Sunray is pumping 10 wells from 7,500 ft., and five "fifth-zone" wells are being pumped from depths below 10,000 ft. The company also reports excellent results in Guijarral Hills field, California, where nine wells are being pumped from depths of 8,200 to 9,000 ft. with long-stroke hydraulic jacks. Some of the wells have been on artificial lift for more than a year.

THE JOURNAL'S WEEKLY

Engineering Reference

SECTION

No. 10

Horsepower Nomograph

IN hydraulic computations, the problem frequently arises to determine quickly the approximate useful or effective horsepower required to move fluid at a known rate against a specified pressure or at a given height. In oil-field practice especially, specific gravity of the liquid may vary, the rate of flow may be expressed in any of several units of volume and time, and the load may be expressed either as pressure in pounds per square inch or as height or distance to which the fluid is to be raised (head).

If the following symbols are assigned to the values involved:

HP = horsepower
Q = number of units of volume
H = height to which fluid is lifted (head)
G = weight of column of fluid, psi. per foot
P = pressure, psi., at point of discharge
C = a constant, being the product of all the fixed factors under consideration

Relationship of the various factors can be expressed by the formula:

$$H \times G \times Q = P \times Q = HP \times C$$

For better application to the nomogram, the formula can be restated as:

$$H \times G \times 1/C = P \times 1/C = K$$
$$= HP \times 1/Q$$

In the illustration, there is shown the solution for the problem to determine the useful horsepower consumed in raising 500 bbl. per day of crude oil from a depth of 5,000 ft. As the nomogram scales are made up like those on a slide rule, we will use only the digits, and determine the decimal point later.

1. Draw index line I, to solve: $H \times G = P$. From 5 on the scale for H, or height of column, at its intersection with lines 0.37 on scale G, or weight of fluid (crude oil), vertically to intersect scale P, or pressure, psi., at 1,850.

2. Draw index line II, from this point on scale P to the point on scale C indicated for "barrels per day," marking an intersection with the reference (diagonal) line, 1/K, to solve the second step: $P \times 1/K = C$.

3. Draw index line III, from Point 5 (for 500) on scale Q, for units of volume, through 1/K, as determined by index line II, to intersect scale HP, for horsepower, at 1.6.

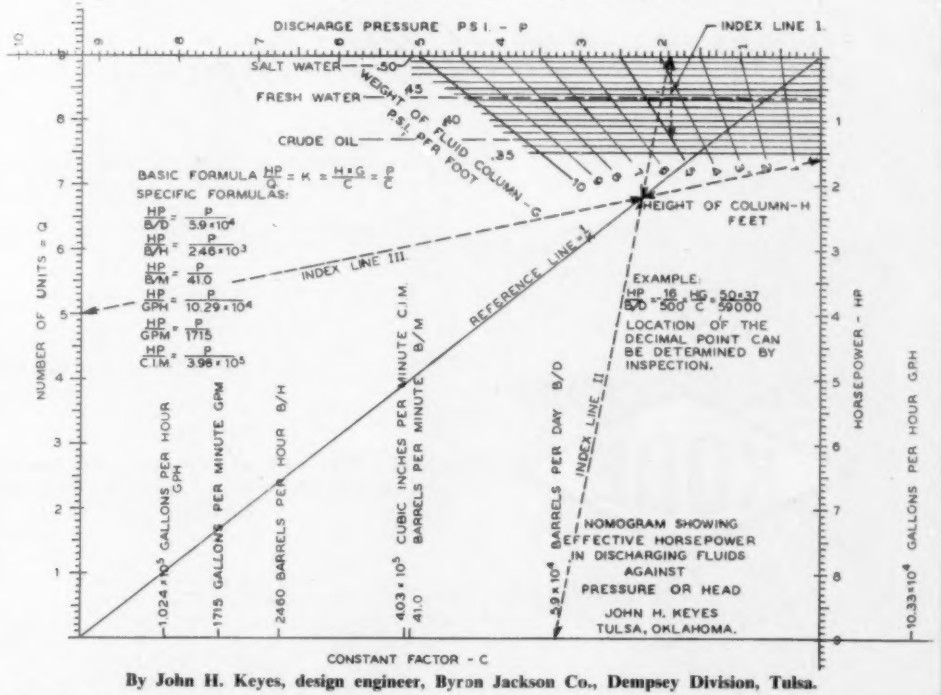
4. Substitute the values found or used for the symbols of the original formula:

$$5{,}000 \times 0.37 \times 500 - 59{,}000$$
$$\times HP\ (0.16,\ 1.6,\ 16,\ \text{etc.})$$

which by visual inspection becomes:

$$1.850 \times 5 = 0.59 \times 16$$

showing 16 as the desired value of horsepower.


DISCHARGE PRESSURE PSI. - P
INDEX LINE I.
SALT WATER .50
FRESH WATER .45
CRUDE OIL .35
WEIGHT OF FLUID COLUMN - PSI. PER FOOT - G
HEIGHT OF COLUMN-H FEET
BASIC FORMULA HP/Q = K = H×G/C = P/C
SPECIFIC FORMULAS:
HP/B/D = P/5.9×10^4
HP/B/H = P/248×10^3
HP/B/M = P/41.0
HP/GPH = P/10.29×10^4
HP/GPM = P/1715
HP/C.I.M. = P/3.98×10^5
INDEX LINE III
REFERENCE LINE - K
INDEX LINE II
EXAMPLE:
HP/B/D = 16 HG = 50×37/500 C = 59000
LOCATION OF THE DECIMAL POINT CAN BE DETERMINED BY INSPECTION.
NUMBER OF UNITS = Q
1.024×10^5 GALLONS PER HOUR GPH
1715 GALLONS PER MINUTE GPM
2460 BARRELS PER HOUR B/H
403×10^3 CUBIC INCHES PER MINUTE C.I.M.
41.0 BARRELS PER MINUTE B/M
5.9×10^4 BARRELS PER DAY B/D
HORSEPOWER - HP
10.33×10^4 GALLONS PER HOUR GPH
NOMOGRAM SHOWING EFFECTIVE HORSEPOWER IN DISCHARGING FLUIDS AGAINST PRESSURE OR HEAD
JOHN H. KEYES
TULSA, OKLAHOMA.
CONSTANT FACTOR - C

By John H. Keyes, design engineer, Byron Jackson Co., Dempsey Division, Tulsa.

Kobe for Better Pumping

More and more oil companies

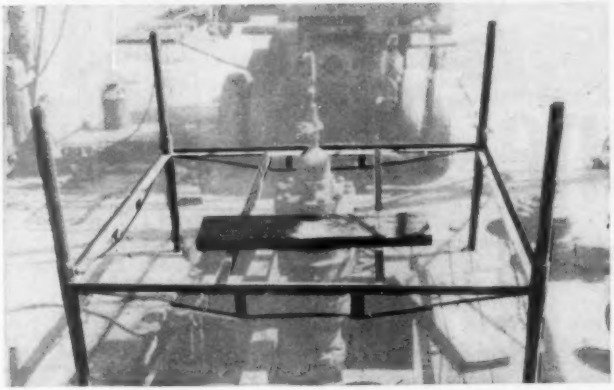
are installing Kobe Free Pumps

on more and more wells.

There is a reason.

KOBE INC. Division of Dresser Equipment Co.
HUNTINGTON PARK, CALIFORNIA — OKLAHOMA CITY, OKLAHOMA

Shale Shaker Mounted on Mud Tank



TO simplify design and arrangements of its small-hole rotary drilling rigs, engineers for one drilling company arrived at an arrangement of mud tank and shaker so that both would occupy the least amount of space when drilling in cramped locations.

The shaker, a motor-operated unit, is mounted on a small steel frame just large enough so that it will rest snugly in place occupying little space. The mud pan below the screen is a narrow flume so that an apron is required to direct the screened mud into the pan. Either end of the flume may be opened or closed by steel gates which slide into guides causing a mud-tight seal. The end leading into the mud tanks is normally open, and is supplied with the gate so that, if the mud requires dumping quickly, this gate may be slid into place without delay while the gate on the opposite end is removed.

The shaker assembly with its supporting frame rests upon two brackets. The brackets are bolted to the end of the tank so they may be removed. Holes in the top section of the brackets match those in the bases of the shaker frame so that bolts can be used to retain the shaker in the desired position.

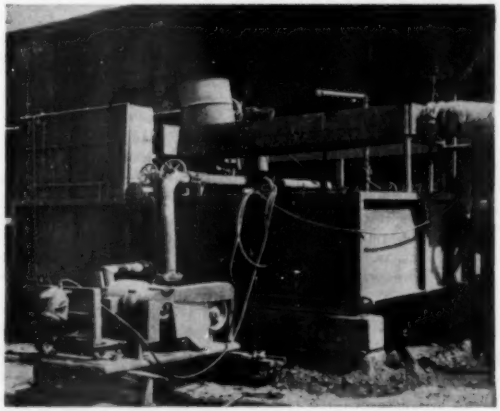
Mud-Processing Units

A MAJOR contractor is successfully using a compact mud-processing unit to treat gas-cut drilling mud. The mud unit is designed to form an integral part of the shale-shaker tank.

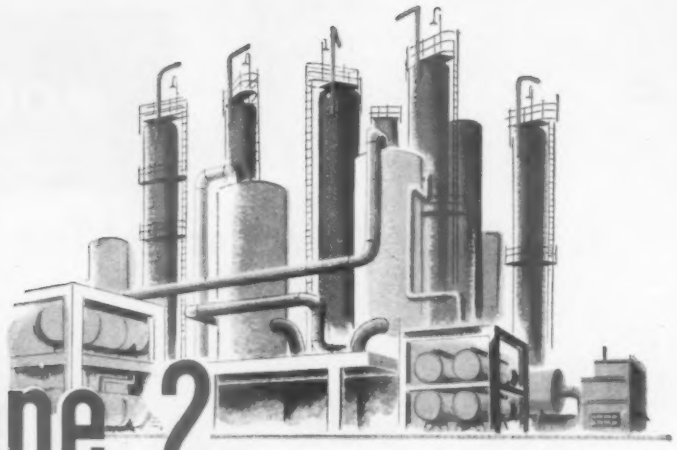
Just beneath the shaker screen is a shallow vat equipped with gates or doors at each end. The doors on one end direct mud flow to the pump-suction pit and those on the other end direct it to the degassing equipment. In normal operations when the mud is clean and free of gas bubbles, a gate is opened so the fluid will flow to the suction pit. The gates or doors are made as hinged weirs which swing upward from vertical to horizontal position when fully opened. They are actuated by a hand wheel welded to the degassing tank.

When gas shows.—If mud from the hole shows bubbling which indicates formation gas, the gate used for normal flow on the suction end of the shaker pit is closed and the one on the degassing end is opened. Screened mud spills over the open weir on the degassing end of the vat into a long, shallow receiver to which the pump suction is connected.

Circulation is accomplished with an outside - mounted, motor - driven centrifugal pump which discharges through a pipe installed in a horizontal position across the degassing end of the shaker tank. The pipe is plugged at its free end and slotted similar to a slotted liner. This arrangement breaks the mud into a thin stream so the entrained gas will be released. The drilling fluid can be circulated continuously while making hole so the gas can be removed without changing the mud.



GAS-CUT DRILLING MUD is treated in this compact processing unit.



Tenamene 2

inhibitor-sweetening

Cuts costs — eliminates danger of contamination — saves time and equipment

Tenamene 2 inhibitor-sweetening involves the use of this efficient Eastman gasoline additive both as a sweetening agent and as a gum inhibitor, and thereby makes possible the combining of two operations in a single step.

Tenamene 2 appears to act as an oxidation catalyst with regard to mercaptans. Its presence in sour gasoline enables refiners to convert mercaptans to disulfides merely by adding 10-20° Baume caustic and bubbling air through such gasoline at slightly elevated temperatures.

The Tenamene 2 itself is not reacted upon and thus remains in the gasoline after the sweetening process to provide effective protection against the formation of gums.

WHEN TO USE: If you are depending upon a solutizer process and have trouble in economically obtaining "Doctor" sweet gasoline, we recommend that Tenamene 2 inhibitor-sweetening be investigated as an adjunct to your present process. When Tenamene 2 inhibitor-sweetening and solutizer sweetening are combined, a considerable reduction in heat costs and a saving in time and equipment can frequently be realized, due to the decrease in recycling necessary in the solutizer units. The small amount of disulfides remaining in the gasoline after this combination treatment does not seriously affect tetraethyl lead susceptibility.

Where oxidation processes such as Copper sweetening or Doctor sweetening are used, we recommend that Tenamene 2 inhibitor-sweetening be considered as a replacement. While this process is also one of oxidation, it not only eliminates the dangers of copper or free sulfur contamination, but also eliminates the costly regeneration of the treating agents.

HOW TO SWEETEN WITH TENAMENE 2: Sour gasoline is first freed of hydrogen sulfide, organic acids and the more reactive mercaptans by a conventional caustic wash. 4 to 26 pounds of Tenamene 2 per 1,000 bbls. of gasoline are then added along with approximately 10 volume percent of 10° to 20° Baume caustic and air or oxygen. The resulting mix is thoroughly agitated and piped to a settler. The effluent from the settler is handled in the same manner as the effluent from conventional sweetening units, except that no more inhibitor is required.

Whatever your present sweetening process, it will pay to investigate Tenamene 2 inhibitor-sweetening. The staff of our gasoline laboratories will be pleased to work with you in determining how this process can be most effectively used in your refinery. Contact your local representative or write to Tennessee Eastman Company, Division of Eastman Kodak Company, Kingsport, Tennessee.

Tenamene EASTMAN GASOLINE ADDITIVES

SALES REPRESENTATIVES: New York—260 Madison Ave.; Framingham, Mass.—7 Hollis St.; Cleveland—Terminal Tower Bldg.; Chicago—360 N. Michigan Ave.; St. Louis—Continental Bldg.; Houston—412 Main St. **West Coast: Wilson Meyer Co.,** San Francisco—333 Montgomery St.; Los Angeles—4800 District Blvd.; Portland—520 S. W. Sixth Ave.; Seattle—821 Second Ave.

by W. L. Nelson
Technical Editor

PROGRESS IN METALS

Methods of Corrosion Testing Can Seldom Be Standardized

THE commotion in the metal processing industry over the merits of salt spray corrosion tests would be amusing were it not at the same time appalling. In the February issue of Materials and Methods, Frank LaQue published "A Critical Look at Salt Spray Tests" and this was followed by a flurry of (invited) comments on LaQue's article and on the general situation by 10 or more corrosion experts. Their comments might be summarized as "Negative Tone Overdone," "Look to Data as Evidence," "A Necessary Evil," "Alternative Method Suggested," "More Misused Than Used," "Test Idealized Though Not Ideal," "Eight Hour Test Sufficient," "Useful But Not Infallible," "Not an Acceptance Test," "Nothing Better Suggested," and "Alternate Wetting and Drying Suggested." Quite naturally these comments did not totally reject the salt spray test, nor was the test held up as an attainment of perfection.

The situation is appalling because all discerning technical men (and this includes all but a few technicians) are well aware that every corrosion phenomenon is somewhat unique, that there is no such thing as a universal or infallible corrosion test. The situation is appalling because it should not be necessary to take the valuable time of more than 10 eminent corrosion engineers to convince procurement agencies, particularly those of our Government, of the facts of (scientific) life. Fortunately, the discussions of these experts are not altogether wasted because in the very explanation of the situation the merits, usefulness, shortcomings, failures, limitations, and specific applications of salt spray tests have been thoroughly explored. The furor arose not so much as a complaint against the test but because of the failure of specification writers, research workers, procurement agencies, etc., to recognize or appreciate the limitations of the test, or of corrosion tests in general.

Only rarely is a corrosive condition so clearly defined or so simple that an infallible corrosion test can be developed. The usual corrosion condition is so complex that no single test can be relied upon to completely foretell the degree of corrosion that will occur in commercial practice, even though the commercial conditions appear to be identical. When a test method is used not for one corrosion condition, but is applied to a wide variety of conditions, then confusion is certain to arise, and this is what happened to the salt spray test. Enormous sums of money and many years of time have been spent on the salt spray test, and there are undoubtedly several (or many) corrosive conditions that can be adequately gaged by the use of the test.

S.A.E. Classification Of Tool Steels

A NEW system of classifying and identifying tool steels has been added to the S.A.E. Recommended Practice on Tool and Die Steels.

The system divides tool steels into six major groups and assigns these letter symbols:

Water-hardening tool steels	S
Shock-resisting tool steels	O
Cold-work tool steels	W
Oil-hardening types:	
Medium-alloy air-hardening types	A
High-carbon high-chromium types	D
Hot-work tool steels:	
Chromium-base types	H1-H19
Tungsten-base types	H20-H39
Molybdenum-base types	H40-H59
High-speed tool steels:	
Tungsten-base types	T
Molybdenum-base types	M
Special-purpose tool steels:	
Low-alloy types	L
Carbon-tungsten types	F
Mold steels, low-carbon types	P1-P19
Mold steels, other types	P20-P39

The classification is the fruit of several years of effort by Division XXVIII—Tool and Die Steels of the S.A.E. Iron and Steel Technical Committee. In working out the classification, Division XXVIII had the cooperation of the American Iron and Steel Institute's sectional committee on classification of tool materials. Now the S.A.E. Technical Board has approved the resulting system, and it will be incorporated into the 1952 S.A.E. Handbook.

Titanium Metal Production Soars

ACCORDING to the Bureau of Mines, U. S. Department of the Interior, the production of titanium sponge during 1951 was approximately 700 tons, and by the end of the year the rate was about 1,400 tons per year.

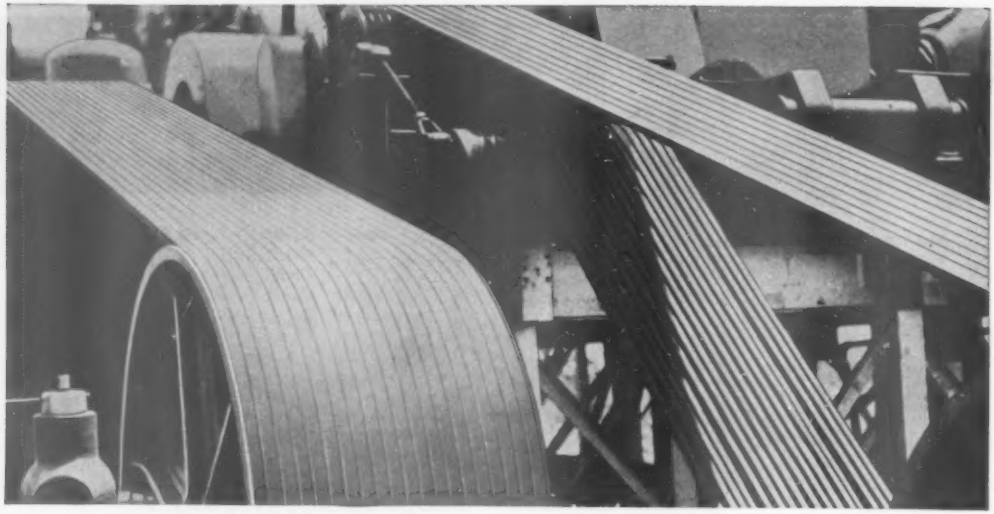
Titanium sponge acceptable to the Government has the following specifications: Titanium content 99.3 per cent minimum; total maximum impurities, 0.7 per cent; iron, 0.25 per cent maximum; nitrogen, 0.03 per cent maximum; chlorides to be established based on operating and storage experience; and hardness, after arc melting in an inert atmosphere less than 250 Vickers or 61 Rockwell A.

Sponge is being manufactured by E. I. du Pont de Nemours at Newport, Del.; Titanium Metals Corp. of America at Sayreville, N. J., Niagara Falls, N. Y., Henderson, Nev., and leased facilities at Boulder City, Nev., and Crane Co. at Chicago. Most of the production comes from the first two companies.

Titanium is useful in the manufacture of jet engines because of its resistance to corrosion, its low weight, and its strength at high temperatures.

Low-Temperature Welding Terms

Thin flowing.—Term applied to alloys which flow freely between adjacent metals due to their capillary action. They are used in lap and square butt joints.



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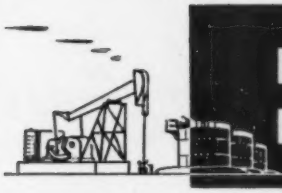


Calculation of Bottom-Hole Pressure in Gas Wells

by Ralph F. Nielsen*

IN making flow tests on gas wells[1] or on gas-injection wells it is usually desired to calculate the bottom-hole pressure from the well-head pressure under either shut-in or flowing conditions. Under static conditions the problem resolves itself to evaluating the weight of the column of fluid in the well bore. Thus:

$$dP = -s\,dh \qquad (1)$$

where:
P = pressure d = density h = height

in foot-pound units.

If the fluid is all gas, d = 28.9 GP/1,544 ZT where the symbols have the usual significance (Engineering Fundamentals No. 483). On substituting this for s in Equation 1 and assuming Z and T to be constant at their mean values Z′ and T′, the equation may be integrated between P_T and P_B, the top and bottom pressures, giving:

$$P_B = P_T\, e^{0.0187GH/53.4Z'T'} \qquad (2)$$

where H is the vertical depth in feet and the pressures may be expressed in any consistent units. If Z is assumed constant and T is assumed to vary linearly with depth, that is, $T = T_1 - bh$ where $b = (T_B - T_T)/H$, Equation 2 is again obtained except that T′ si the logarithmic mean of the top and bottom temperatures, or:

$$T' = \frac{T_B - T_T}{\ln (T_B/T_T)}$$

In deriving a formula for flowing conditions we may start with Bernoulli's theorem and proceed as for horizontal flow except for inclusion of the dh term. However, the acceleration work term u du/g may ordinarily be omitted:

$$dP + s\,dF + s\,dh = 0 \qquad (3)$$

*Associate professor, petroleum and natural gas engineering, Pennsylvania State College.

The term s dF represents the pressure loss due to frictional work which may be evaluated from the differential forms of the Weymouth or Clark equations:

$$d(p^2) = 2p\,dp = \frac{Q^2 Z'GT\,dL}{(15{,}300)^2\, d^{5.33}} \quad \text{(Weymouth)} \qquad (4)$$

$$d(p^2) = 2p\,dp = \frac{Q^{1.85}\, Z'T\, G^{0.85}\, z^{0.15}\, dL}{6{,}550^{1.85}\, d^{4.85}} \quad \text{(Clark)} \qquad (5)$$

where p is in psi. Substituting L = 1/5,280 and p = P/144:

$$dP\ (\text{friction}) = s\,dF = \frac{Q^2\, Z'GT\,dl}{1.2 \times 10^7\, d^{5.33}\, P} = \frac{W\,dl}{P} \qquad (6)$$

or

$$= \frac{Q^{1.85}\, Z'T\, G^{0.85}\, z^{0.15}\,dl}{6 \times 10^6\, d^{4.85}\, P} = \frac{C\,dl}{P} \qquad (7)$$

Substitution, together with the value of s, in Equation 3 gives:

$$dP = -\frac{W\,dl}{P} - \frac{0.0187GP\,dl}{ZT\cos x} \qquad (8)$$

where cos x = dh/dl = the cosine of the angle or deviation from the vertical. Assuming again that Z and T are constant at Z′ and T′ and denoting 0.0187 G/Z′T′ cos x by a, integration gives:

$$\frac{1}{2a} \ln \frac{aP_B^2 + W}{aP_T^2 + W} = 1 \qquad (9)$$

where l = H/cos x is the length of the flow string. Solving for P_B gives:

$$P_B^2 = e^{2a1} P_T^2 + (e^{2a1} - 1)\, W/a \qquad (10)$$

Substituting for a and W from above and P = 144p:

$$p_B^2 = e^{2m} p_T^2 + (e^{2m} - 1) \times \frac{(QZ'T')^2}{4.6 \times 10^{10}\, d^{5.33} \cos x} \qquad (11)$$

where m = al cos x = GH/53.4Z′T′ is the same exponent as in Equation 2. If C is used instead of W from Equation 8 on, the bottom-hole pressure in psi. is given by:

$$p_B^2 = e^{2m} p_T^2 + (e^{2m} - 1) \times \frac{Q^{1.85}\,(Z'T')^2\, z^{0.15}}{2.3 \times 10^9\, d^{4.85}\, G^{0.85} \cos x} \qquad (12)$$

For downward flow, as in an injection well, the plus signs in Equations 11 and 12 become minus. It is seen that the equations reduce to Equation 2 when Q = 0.

Fig. 1 illustrates the magnitude of the effect of depth on pressure under shut-in conditions. In calculating the curve Z′ was taken as 0.9 and T′ as 550 + 0.01 H.

If there is liquid in the well the above equations obviously cannot be applied directly.[1] Neither do they apply to extremely high rates of flow.

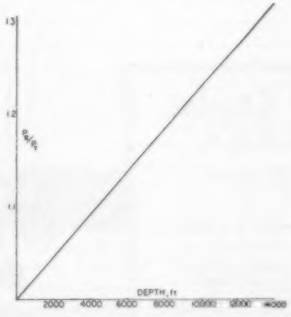
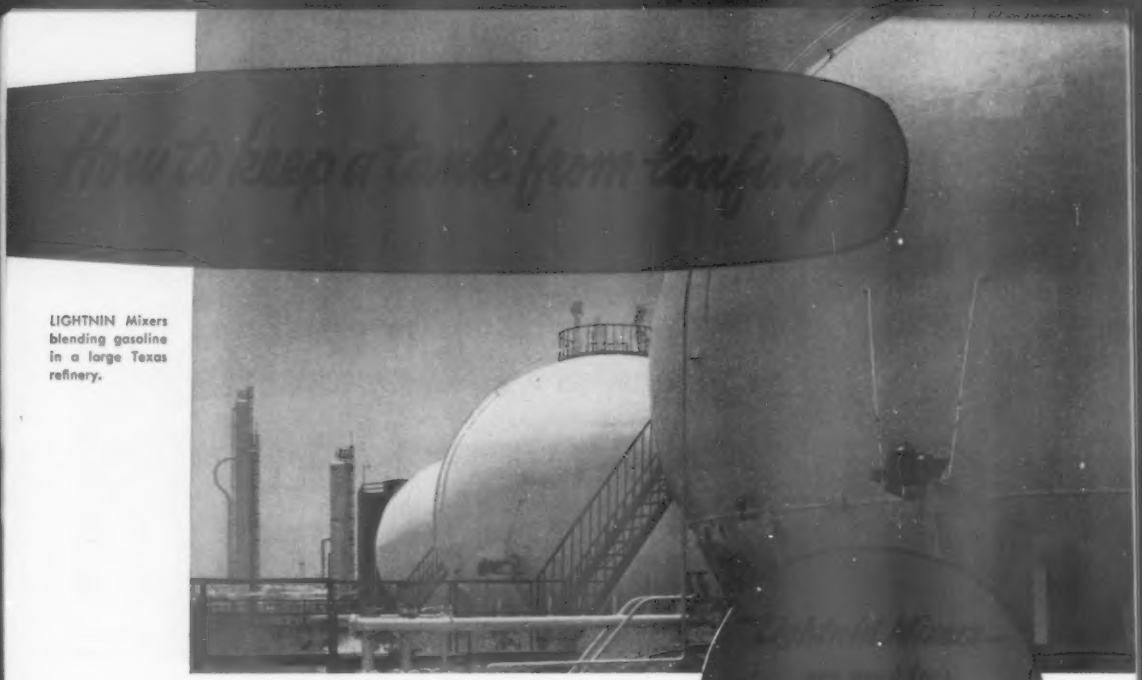


Fig. 1 — Variation of pressure with depth under static conditions.

Reference

1. Rawlins and Schellhardt, Back-Pressure Data on Natural-Gas Wells and Their Application to Production Practices, Bureau of Mines Monograph 7.



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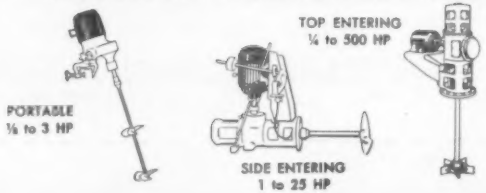

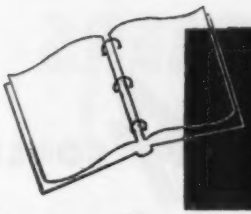

How to Figure Pressure Drop . . .

when back-pressure relief valves are used

by S. Chesler* and B. W. Jesser†

1. Adiabatic Flow

COST comparisons have been given for the cases when: (1) relief valves are set below vessel design pressure, and (2) back-pressure relief valves are used.

In passing it should be pointed out that the comparable cost of an open system for the layout shown in Fig. 1 of No. 125, Refiner's Notebook, is $6,600 including the cost of snuffing steam piping.

Where closed systems are required for one reason or another, the cost of the system can be considerably reduced by the two means presented, namely setting the relief valve below the design pressure and the use of back-pressure relief valves. The former is particularly advantageous for minimum thickness vessels where the increased vessel costs resulting from raising the design pressure are usually very small compared to the savings in piping and relief valves in a closed discharge system. In cases above the minimum thickness range the advantages are limited somewhat but on occasions the method may have considerable value where one vessel is the "bottleneck" of the system.

In connection with the line calculations for a relief-valve discharge system, it is a rather prevalent procedure to calculate the pressure drop for any given line on the basis of the average pressure in that line. For low pressure drops, the error is not appreciable. But in the case of high pressure drops such as those produced when back-pressure valves are used, it is essential that the pressure drop be calculated using either the isothermal approach of Lobo, Friend, and Skaperdas[1] or the adiabatic approach of Lapple.[2] The use of average pressure rather than the adiabatic or isothermal methods may result in errors as high as 25 to 30 per cent. An example illustrating a pressure drop calculation by these two methods will be given later.

For small pressure drops the density of a vapor or a gas is very nearly constant and, just as in the case of liquid flow, the Fanning equation can be used for calculating the frictional losses for vapor flow in pipes.

However, for large pressure drops the density varies markedly from point to point along the line thereby introducing changes in the kinetic energy. Since the Fanning equation makes no allowance for these changes in the kinetic energy, a basic pressure-drop formula for the flow of compressible fluids in straight horizontal pipes of uniform cross-section must be used.

*Piping engineer, and †head piping analytical section, M. W. Kellogg Co. From paper presented at A.S.M.E. Toronto meeting, 1951.

Adiabatic Flow of Gases

Adiabatic flow of ideal gases (with friction) in straight horizontal pipes of uniform cross-section has been treated by Lapple[2] and others. However, the charts that Lapple prepared do not lend themselves very readily to the type of problems that involve the determination of pressure at the end of the line when the flow and the pipe inlet conditions are known. Furthermore, the form of his equations is not applicable directly, without transformations and rearrangements, to the method of pressure drop calculations used by the authors.

Equations for adiabatic flow comparable in form to those obtained by Lobo, Friend, and Skaperdas for isothermal flow are desirable.

One such equation can be obtained directly by integrating the energy balance equation:

$$v\,dp + \frac{V\,dV}{g} + \frac{2f\,V^2\,dL}{gd} = 0 \quad (1)$$

utilizing the equation of continuity:

$$G = V/v \quad (2)$$

where:

- G = mass velocity of gas, lb. per sec. per sq. ft.
- V = linear velocity, ft. per sec.
- v = specific volume of gas, cu. ft. per lb. $= 1/\rho$
- g = gravitational constant
- f = Fanning friction factor

and the equation of state for adiabatic flow:

$$pv + [(k-1)/k]\,(V^2/2g) = \text{constant} \quad (3)$$

The result of the above integration leads to the following expression:

$$\left[1-\left(\frac{\rho_2}{\rho_1}\right)^2\right]\left[1+\left(\frac{k-1}{2k}\right)\frac{G^2}{g p_1 \rho_1}\right]-\left(\frac{k+1}{2k}\right)\frac{G^2}{g p_1 \rho_1}\ln\left(\frac{\rho_1}{\rho_2}\right)^2 = \frac{2\Delta P_F}{P_1} \quad (4)$$

where:

- ΔP_F = frictional pressure drop in entire length of pipe based on inlet (upstream) conditions, lb. per sq. in.

The equation of state (3) can be expressed as follows:

$$\frac{\rho_2}{\rho_1}-\left(\frac{k-1}{2k}\right)\frac{G^2}{g p_1 \rho_1}\left[\frac{\rho_1}{\rho_2}-\frac{\rho_2}{\rho_1}\right] = \frac{P_2}{P_1} = 1-C_A\frac{\Delta P_F}{P_1} \quad (5)$$

where C_A is the kinetic energy correction factor for adiabatic flow.

Equations 4 and 5 are pressure drop equations for the flow of ideal gases in straight horizontal pipes of uniform cross-section for adiabatic process with friction.

Note that for $k = 1$, Equation 5 reduces to $p_1v_1 = p_2v_2$ and Equation 4 also reduces to an equation representing the isothermal case.

References

1. Lobo, W. E., Friend, L., and G. T. Skaperdas, Ind. and Eng. Chem., Vol. 34, p. 821 (1942).

2. Lapple, C. E., Trans. A.I.Ch.E., Vol. 39, p. 385 (1943).

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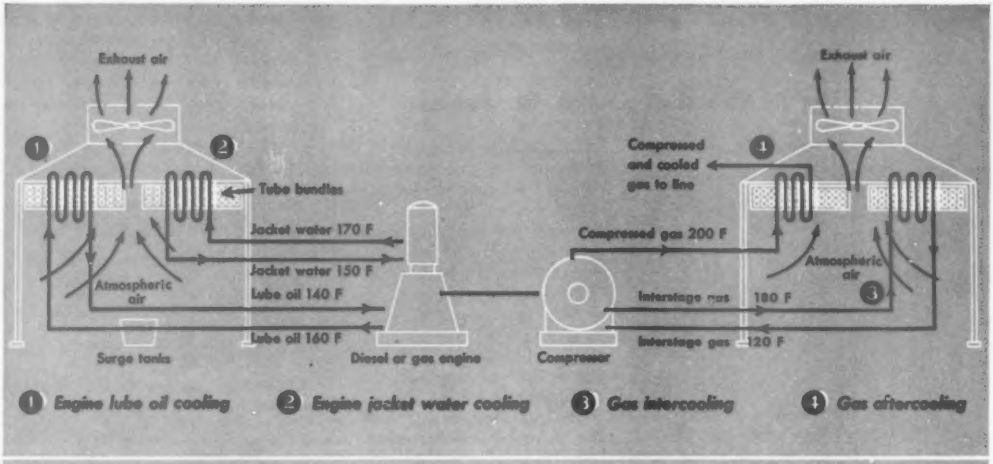

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How to Protect Storage Tanks—3

Reinforced Gunite

THE pneumatic application of concrete mortar (Gunite) on internal surfaces of tanks for protection against corrosion was initiated in 1933. At that time linings were installed approximately ¼ in. thick, without reinforcement. Experience soon proved the necessity for steel reinforcement and increased thicknesses of Gunite.

Typical installations are as follows:

1. Roof protection — including rafters and girders.
2. Roof protection and top ring.
3. Bottom protection — including sumps.
4. Bottom protection and lower shell ring.
5. Complete internal coverage.

Installation costs vary with local conditions, size of vessel, amount of surface to be protected, design of roof supports; i.e., the number of columns, circular girders, knee braces, and similar installations. Some jobs have cost up to 90 per cent of a replacement in kind with steel, although the average is about 75 per cent, and some are as low as 50 per cent. In cases where roofs are penetrated in 3 to 4 years, there is no question that a maximum-cost (90 per cent) liner would have an attractive payout.

Ultimate life of a properly applied Gunite liner in sour-crude (or process-gas-oil, or similar) service is not known. Some engineers use 20 years as an estimating figure. This conservative figure is based on an observation of liners in sour service for 12 years. Several of the approximately 100 Gunited tanks have been inspected; however, the majority have never required entry since the application of the liners.

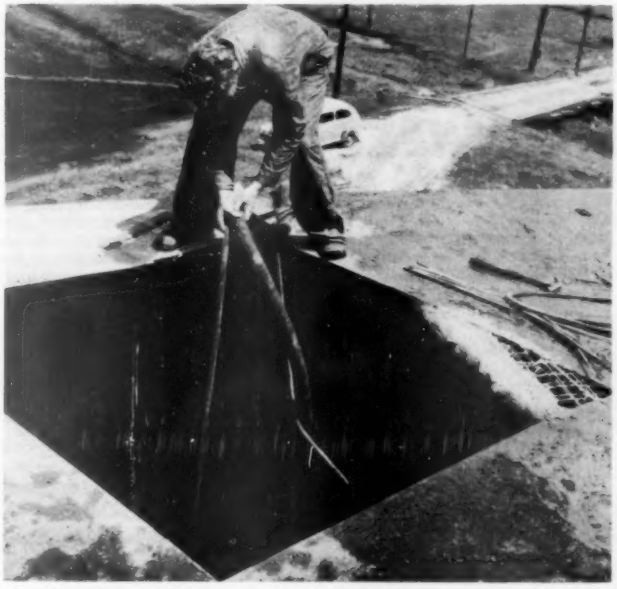

Fig. 1—Tank-roof opening used in Guniting tank interior.

Gunite protection is not attempted on roofs where the steel has lost two-thirds of its original weight. When calculations and other considerations indicate that corrosion has progressed to such an extent that tank members are not satisfactory for the additional loading, the liner is not applied. The methods of calculation and stresses are specified in *American Petroleum Institute Standards 12-A and 12-C.*

Preparation of tank . . . The usual procedures of cleaning and gas-freeing tanks must precede any application of a Gunite liner. Following cleaning, the vessel must be thoroughly inspected to determine if the structure will support the added load; repairs and replacements are made; and all surfaces are sand-blasted.

The following utilities are provided in conjunction with a Gunite job:

1. Compressed air at 90 psi. and 300 cu. ft. per min.
2. Steam at 150 psi. for jet cleaning, removal of rebound, and maintenance of effective curing temperatures during cold weather. Steam is desirable, but not absolutely essential.
3. Alternating current for welding machines—usually 3-phase 60-cycle 440-volt.
4. Alternating current for illumination—single-phase 60-cycle 110-volt.
5. Water for cleaning the tank and preparing Gunite mix.

Provision of an opening in the roof of any large tank being lined with Gunite is a necessity to insure efficiency, to improve ventilation, and to lower the atmospheric temperature inside the vessel. Fig. 1 illustrates the size of the roof opening, and also shows various stages of completion of a liner which will cover the under side of the roof, the rafters, about 24 in. of the top shell ring, and corresponding amounts on the columns.

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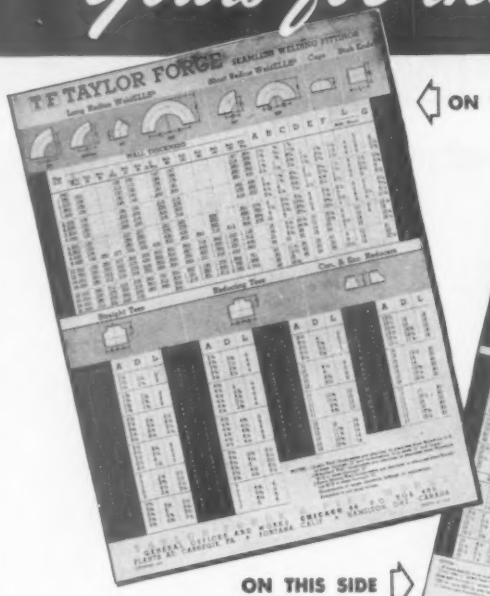

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and English, illustrates complete multi-speed and single-speed machines with electric motor, available with handpiece or pedal switch for regulating speed from approximately 700 to 12,000 r.p.m. Sections are included on accessories, spares, and single parts, with a complete price list. *Otto Suhner.*

10 WIRE ROPE TON-MILE CHART FOLDER explains and illustrates how to determine wire-rope ton miles and evaluate rotary drilling lines. Enlarged charts show effective weight of drill pipe, tubing, and drill collars in drilling mud, as well as ton-miles per round trip per effective weight of pipe. *A. Leschen & Sons Rope Co.*

11 CORROSION-RESISTING PROPERTIES OF AUSTENITIC CHROMIUM-NICKEL STAINLESS STEELS, a 32-page booklet, contains 18 tables showing results of tests on numerous austenitic stainless steels in various solutions, acid, neutral and alkaline. *International Nickel.*

12 GIST CENTRALIZERS, in regular, collar, and cage types, made for centering casing in a well bore, are described and illustrated in a multicolored pamphlet. Installation views and other performance data are given. *Gist Specialties Co.*

13 SEAL OF QUALITY AND SERVICE is an illustrated broadside showing 10 years of progress from 1942 to 1952 of a manufacturer of chemicals and coatings for the petroleum industry. *Kem-I-Kal Engineering Laboratories, Inc.*

14 HEAVY-DUTY HYDRAULIC TORQUE CONVERTER is a four-page bulletin which illustrates three elements of Torcon converter unit: pump, turbine, and reaction member. Typical applications of this heavy-duty unit are listed and depicted, such as shovels, cranes, front-end loaders, oil-well rigs, and tractors. *Torcon Corp.*

15 SODIUM ZEOLITE SOFTENER. Bulletin gives a detailed explanation of zeolite water softening, including a glossary of terms used in the process, data for laying out a zeolite softening plant, factors governing size of equipment, selection of zeolite materials, and detailed description of four stages of operation of sodium zeolite softener. *Cochrane Corp.*

16 NEW MODEL 300-B DIAMOND "UTILISCOPE" (wired television) is described and pictured in Bulletin 1025-A, which includes sections on typical uses and technical information. *Diamond Power Specialty Corp.*

17 TYPE D CASING HEAD, designed to seal off single string of casing in wells of medium depth and pressure where an independent tubing head is used to support the tubing, is described in a four-page folder. Full-color cutaway drawing of casing head is supplemented by a table showing wide range of sizes available. *The National Supply Co.*

18 SERVICE TOOL MANUAL. New 12-page manual gives complete information on new O.T.C. tools especially designed for servicing International tractors. Both manual and hydraulically operated pulling tools are shown with attachments and accessories for use with O.T.C. power-twin hydraulic puller. *Owatonna Tool Co.*

19 TEFLON PACKING DOES THE JOB is a new catalog sheet giving information on new Teflon-impregnated, braided, white asbestos packing, which can be furnished in coil form or solid continuous ring form. *Flexrock Co.*

20 PILLOW BLOCKS AND FLANGE UNITS. Bulletin 194 describes features, new housing design, permanent factory lubrication sealed in by a synthetic rubber seal bonded to a steel core to retain lubricant and keep out moisture and dirt. It also gives load rating, table, dimensions, prices, and sizes. *T. B. Wood's Sons Co.*

21 THE NEW HENRY PHASE CONVERTER. This new multicolored folder illustrates three standard sizes of phase converters ranging in capacity from 3 to 7½ hp. The equipment is designed to operate 3-phase, 220-volt, 60-cycle motors on a single-phase, 220-volt, 60-cycle power line. *The Henry Electric Co.*

FOR MORE INFORMATION . . . . use one of these cards

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, June 9, 1952

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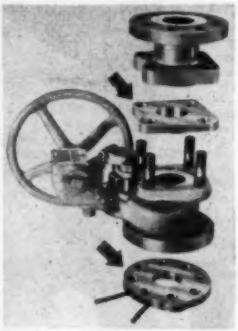
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

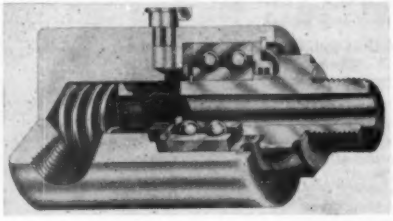
by Dan B. Miller

22 ELECTRICALLY HEATED VALVES. Designed to keep valve mechanisms clear of frost and ice in liquid carbon dioxide lines at temperatures as low as —110° F., many other applications are being developed which include hot, cold, and viscous liquid and gas lines, as well as uses where heated valves have heretofore been economically impractical. Single-disk valves require the heating element at right in the illustration. Double disk valves can be equipped with both elements heated. Heat from the elements is transmitted directly to the valve seats, and as a result, heats entire flow opening through the valve, in addition to the operating mechanism. All heated valve sizes from 2 to 6-in. are available with pneumatic, hydraulic, solenoid, or manual control. Heating elements can be provided for either 110 or 220-volt operation, with inputs ranging from 400 to 3,000 watts per unit. Where flanged-type Okadee valves are now in service, heating elements may be installed by simply exchanging standard studs for studs 1 in. longer. *Okadee Co.*



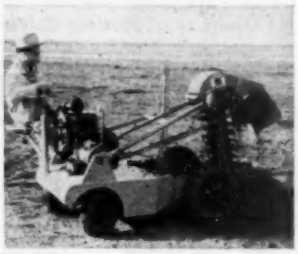
IT'S NEW CHECK IT

23 WICHITA ROTO-COUPLING. It is impossible for grit and sand to enter the bearing and sealing surface. A felt ring, which holds considerable oil, stops these abrasives and also keeps the sealing surface lubricated much longer. The O-ring seal also permits the carbon ring to move forward freely as wear occurs. Other advantages include a wide, copper sealing gasket, snap-type oil cup, and steel stem. The precision double-row ball bearing is protected by a labyrinth seal to keep out sand and grit. Available in ½-in. pipe size with 1-in. N.F. thread on stem, and ¼-in. pipe size with ⅝-in. NF. thread on stem. *Wichita Falls Foundry & Machine Co., Inc.*



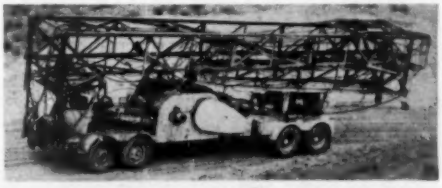
IT'S NEW CHECK IT

24 DITCH-WITCH. Super E, a larger model Ditch-Witch, suitable for all oil-field needs, is now available. This self-contained ditcher operates under its own power to dig a trench 6 in. wide, to a depth of 42 in. Tests show this model will dig as many feet of trench as machine four times its size. Operating and maintenance costs are low. *The Charles Machine Works*



IT'S NEW CHECK IT

25 HOISTMOBILE can be moved from job to job under its own power and can be maneuvered into working position at the well. Rough terrain and hard-to-reach small well locations offer little hindrance to the mobility of the



The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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FACT

Alcoa Aluminum Heat Exchanger Tubes require far less cleaning than Admiralty tubes in furfural service. Aluminum does not catalytically polymerize furfural. Furfural does not corrode aluminum. In metal costs alone, aluminum costs ½ less than Admiralty, ⅓ less than mild steel, ⅙ as much as stainless.

These are actual costs reports from cleaning operations conducted by The Shell Oil Company at *Martinez, California.*

TEST NO.	TUBE SIDE						ESTIMATED SAVINGS (DOLLARS PER YEAR)
15	85 per cent oil, 15 per cent furfural, 305° F	Chrome 280° F	225	1½	4	6	18	1,000
16	85 per cent oil, 15 per cent furfural, 265° F	Admiralty 220° F	325	1½	4	6	18	800
18	17 per cent oil, 3 per cent water, 80 per cent furfural, 315° F	Dry furfural 418° F	1,600	4	4	18	18	1,000

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Propane chilling
Wax sweaters
Lean oil—rich oil exchangers
Amine solution coolers
Glycol-amine heat exchangers and reboilers
Jacket water coolers

CHEMICAL

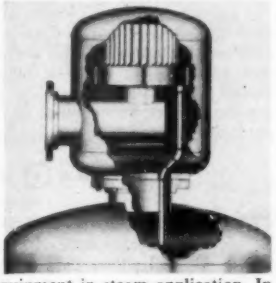
Butanol
Ethanol
Ethylene Glycol
Glycerin
Hydroabietyl
Isopropanol
Methanol
Phenol
Propylene Glycol
Acetaldehyde
Formaldehyde
Furfural
Heptaldehyde
Acetic acid
Stearic, Palmitic, Maleic Oleic acids
Butyric acid
Naphtha
Ricinoleic acid
Acetanilide
Ammonia
Hydrogen Cyanide
Nitric acid (concentrated)
Pyridine
Hydrogen Sulfide
Benzene
Dichlorobenzene
Gelatin
Hydrogen Peroxide
Turpentine
Xylene

Use Alcoa Alclad 35-H14 Heat Exchanger Tubes with fresh, brackish and salt-cooling waters

unit. This is attributable to its unique design and also to the ample propulsion power furnished by a six-cylinder General Motors diesel engine equipped with G.M. torque converter. On location the operator can drive into position at the well without complicated backing and with excellent visibility from the cab. The Hoistmobile is a four-axle vehicle, 35 ft. in length, with the engine mounted at the extreme rear, a double-drum winch amidships, and a folding derrick at the front, over the cab. The rear-end assembly is a standard tandem axle and differential unit equipped with dual wheels. The front-end assembly is a pair of tandem axles also, equipped with single wheels, but with both pairs of wheels steerable. *Hopper Machine Works.*

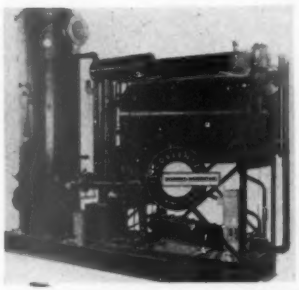
IT'S NEW CHECK IT

26 INTERNAL DOWNFLOW PURIFIER FOR VESSELS. Dirt, moisture, riser discharge, and solids are removed before passing on to the distribution piping when this new internal downflow purifier is installed in an auxiliary tank immediately above evaporators, packed towers, deodorizers, stills, bubble-cap towers and inside steam drums, flash tanks, receivers, and other vessels. It will increase heating efficiency and protect pipe-line equipment in steam application. In chemical and petroleum vessels, it will recover valuable vapors. Hi-eF Purifiers carry a guarantee to the boiler user to deliver vapor with 1 p.p.m. or less of total solids. In other applications the purifier is guaranteed to remove 99 per cent of all entrainment. *The V. D. Anderson Co.*



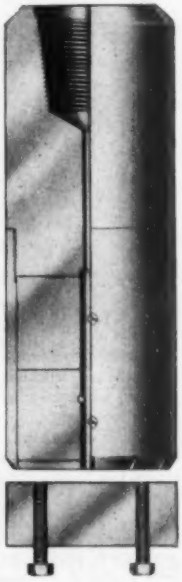
IT'S NEW CHECK IT

27 CHILLED WATER VIA WASTE HEAT. Development of this unit was undertaken to obtain a more economical and reliable source of refrigerated cooling water. By using the waste heat in the exhaust a power economy, resulting from the installation of an internal-combustion engine, can be greatly increased. A complete packaged unit, which requires no field assembly, provides an economical source of chilled water for a wide range of applications by combining the waste-heat boiler and an hermetically sealed refrigeration system on one base. The refrigeration tonnage delivered is in the form of chilled water which is easily piped to external heat-exchange surfaces for cooling effect. There are no moving parts within the absorption refrigeration unit. The picture illustrates the Model IAC-25 with a hermetically sealed absorption refrigeration system. The rated capacity of this system is 25 tons of refrigeration. The unit is complete with temperature controls and a chilled water-circulating pump. The refrigeration produced is in the chilled water at a temperature from 40° to 50° F., using 85° F. condensing water. The exhaust-gas boiler is rated for a 900-hp., 4-cycle turbocharged engine. The steam system is complete with accessories and condensate return unit. *Coblentz Equipment Co.*



IT'S NEW CHECK IT

28 BOWEN KINGSTON FISHING MAGNETS are used to retrieve all types of small objects having magnetic attraction, such as bit cones, slips, milling cuttings, tong pins, and hammers. The illustration reveals the simple, compact structure of the fishing magnet. It consists essentially of a body, a nonmagnetic stainless-steel sleeve, and permanent magnets. There are no moving parts. The plate protects the magnets from any damage that might result from physical contacts. All sizes of these tools are provided with a circulating hole large enough for all standard purposes. The power of this fishing magnet is concentrated at its engaging end. This avoids any attraction with the walls of the casing, and assures unrestrained lowering into the well. With proper care, the life of the magnets can be prolonged indefinitely. Keepers are furnished with each unit to prevent magnetic dissipation while the tool is not in use. *S. R. Bowen Co.*



IT'S NEW CHECK IT

29 MODERN LARGE HIGH-VACUUM PUMPS are of particular value to many branches of the oil, gas, and general engineering industries. Capacities are up to 250 cu. ft. per minute. These pumps are made in various sizes and capacities, in general are all contained in a small compact rectangular tank or casing, with a top cover, and an outer flywheel driving pulley, running on a trunnion. For condensable gas circuits a special drip feed pump is used which enables the contaminated oil to be discharged out of the pump, thus keeping the internal working parts as free as possible from any detrimental effect which the gases might have on metals, retaining always the highest possible vacuum. For purposes of distillation and desicca-

tion a duplex pump is supplied in which the primary unit is heated up to about 220° F., in order to keep the gases permanent by preventing condensation, while a secondary cylinder is kept cold and drip fed, so that the product can be reduced to complete dryness. *Pulsometer Engineering Co., Ltd.*

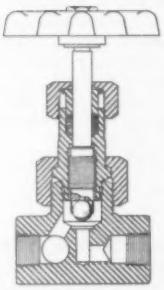
IT'S NEW CHECK IT

30 FORMASEAL—NEW LOST-CIRCULATION MATERIAL is a special type of air-blown asphalt that is mixed into the drilling mud to prevent loss of circulation. It can be used with any type of mud, and forms a mat on the walls of the well. It plasters off porous formations while drilling is in progress. It is soluble in crude oil and will not permanently plug the producing formation. Formaseal is a black, granular material sacked in 50-lb. paper sacks. It is not subject to bacterial action and can be stored indefinitely. Under temperature and pressure, the particles bond together to form a tenacious cake. It comes in two blends, coarse and fine. With oil-base mud or crude oil, Formaseal may be added directly to the mud stream, while circulating, and prior to entering the anticipated lost-circulation area, or it may be spotted in a "pill" after lost circulation has started. With water-base or oil-emulsion muds, Formaseal is best utilized after lost circulation has begun. *Oil Base, Inc.*

IT'S NEW CHECK IT

31 NEW PORTABLE EMERGENCY SHOWER. To meet the increasing risks and hazards of fire, acids, and other contaminants to the human body, emergency showers are now being widely used in industry. Instantaneous wetting and washing of all parts of the body and clothing of persons exposed have been found effective in reducing serious injuries. The mobile emergency shower is a completely portable unit that can be moved from place to place quickly and easily, thus making protective equipment always available where and when it is needed. Mobility is achieved by easy-rolling casters of ample size. The unit is held fixed in position by means of adjustable truck stops. A ramp is provided, for easy access to the shower, which locks into position out of the way when shower is being moved. The use of entirely new techniques in spraying water makes it possible to rapidly quench fire and to rapidly dilute and remove acids or other chemicals and foreign materials contaminating clothing or the human body. *Logan Emergency Showers, Inc.*

IT'S NEW CHECK IT



32 NEW BALL VALVE. A new ¼-in. ball valve is recommended for working pressures up to 3,000 psi. Tight, positive shutoff is provided by a stainless-steel ball which closes into a machined, conical seat. The ball, retained at the end of the stem, is free rolling so that every closing brings a new surface into contact with the valve seat. Alignment of ball to seat is accurately piloted by a forged-steel, union-type bonnet, fitting tightly to the body and assuring a correct valve closure. The long-stroke stem and the packing gland are made of stainless steel for durability and resistance to corrosion. The packing is a preformed, graphited asbestos with a plastic binder and can easily be replaced without shutting off the line pressure or interrupting the process. Straight-through and angle types are available with two and four connections. *The Foxboro Co.*

IT'S NEW CHECK IT

33 THOMPSON BALL-HOUSING CAGE. The new positive-action cage with stationary ball-housing guide enclosing the ball allows fluid to bypass the ball, thus eliminating fluid restriction. It also eliminates ball spinning and chatter, preventing ball from beating out the cage. Center hole in the ball-housing guide places fluid load directly on top of ball. The housing controls the ball at all times guiding it swiftly and directly back on the seat. Fast opening and closing action helps overcome subsurface problems such as gas lock and bad sand conditions. Available in all types and sizes. *Thompson Pump Co.*

IT'S NEW CHECK IT

34 A NEW TYPE OF SPLASH PLATE for protection of extension rods and crossheads in slush pumps is easier to install and costs less to maintain. As the piston rod of the slush pump slides in and out of the cylinder liner mud and abrasive substances may leak from the cylinder. If such injurious substances reach the extension rod, damage to vital power parts can result. The new splash plate is a disk of thick, tough plastic material, made for all types of oil-field slush pumps. Unlike conventional splash plates, the Oteco plate is not an integral part of the lock nut. It is a separate plate slipping easily into a matching groove in all Oteco Hammer-Up Lock-Nuts. Thus any Oteco Hammer-Up Lock-Nut can be equipped for splash-plate service, and it is not necessary to carry special nuts with plates attached. In case of damage, only the splash plate need be replaced. *Oteco Equipment Co.*

IT'S NEW CHECK IT

Among the Drilling Contractors

Calvert Keeps Six Rigs Busy in Tri-State Area

Calvert Drilling, Inc., Olney, Ill., one of the more active contractors and operators in the tri-state area of Illinois, Indiana, and western Kentucky, reports its six rotary rigs are being kept busy continuously.

Two of these rigs currently are in the Rural Hill field, Hamilton County, Illinois, where one is on contract to Stewart Oil Co. and the other is drilling on a partnership deal with H. V. Spires. Two rigs, one in the East Goff field, Wayne County, and the other in the Ingraham area, Clay County, are on partnership wells the company is drilling with J. N. Hockman. Another is under contract to Cities Service Oil Co. in the Friendville field, Wabash County, also in Illinois, while the remaining rig is on a partnership well with Walter Duncan in the Stooker area, Posey County, Indiana.

John Caudle is the contractor on a shallow test which Grisham - Hunter Corp. is starting as a "twin" to its recently completed deep gas - discovery well in Culberson County, Texas. The new operation, 1-A Grisham fee, projected to 1,600 ft., is being drilled with combination cable and rotary tools. The discovery well produces from a depth of 9,054 ft.

Talking over the success they are having with air drilling in the South Mountain field, near Santa Paula, Calif., are (left to right): C. C. Dupuy, drilling foreman for Bell & Burden, Inc., Los Angeles, contractor; G. J. Wimer, drilling foreman, and A. H. Curry, production foreman, for Shell Oil Co. in the Santa Paula district. (See story May 19, 1952, issue, page 85).

Fast Drilling Time Made In Elk Hills Field Well

A crew of Thomas P. Pike Drilling Co., Los Angeles, performed some unusually fast drilling at a well the contractor put down for Standard Oil Co. of California in the Elk Hills field of San Joaquin Valley, California. According to John Fowler, drilling superintendent, the crew, working daylight tour, made 894 ft. of 15-in. hole in 8 hours. Hole drilled was from 684 ft. to 1,578 ft. Floyd French was driller.

California Contractors Conduct Safety Clinics

The American Association of Oilwell Drilling Contractors is sponsoring a series of safety clinics in various California producing areas. The first, held at Newhall, was attended by more than 125 contractors and their field and safety personnel, mainly tool pushers, drillers, and drilling crews. Others are to be held at Long Beach, Bakersfield, and Ventura. Harry H. Hillman, president of California Production Service, Long Beach, and John Grant, vice president of Loffland Brothers Co., Los Angeles, are in charge of the meetings.

C. A. Hilburn Drilling Co., Shreveport, has a contract with W. C. Feazel and associates, also of Shreveport, calling for a 6,000-ft. test to be drilled on the operators' Rea lease, 3 miles northeast of Hamilton, in Monroe County, northeastern Mississippi. The location is 16 miles from any other production.

Pyburn-Langford Drilling Co., Shreveport, has the contract for a well which J. Paul Ratliff, Jr., is starting as the east offset to Shell Oil Co.'s indicated Cotton Valley discovery well in northern Union Parish, northeastern Louisiana. The new operation is 1 Frost with location in 35-23n-2e.

Helmerich & Payne, Inc., Tulsa, has a deep exploratory test under way in southern Fremont County, Wyoming. The well, 1 Red Desert Nose, located in the C NW SW 36-27n-94w, is being drilled on contract for Robert S. Lytle.

tops in the oil country

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It is projected to 10,000 ft. Location is about 20 miles west of the prolific Lost Soldier field.

Southern Six Drilling Co., Baton Rouge, La., has a 14,600-ft. test under contract for the Grassy Lake area of St. Martin Parish, coastal Louisiana. The test, a wildcat, will be drilled for Atlantic Refining Co. Location is on a state lease in 11-15s-13e.

Fortenberry Drilling Co., Natchez, Miss., is starting work on an 8,000-ft. contract it has with Humble Oil & Refining Co. for a test located 4½ miles southeast of Tokio, Wayne County, Mississippi. Location of the test, 1 McIlwain, in 33-9n-5w, is only 1½ miles from the Alabama line.

J. F. Well Servicing Co., Brookhaven, Miss., has taken a contract for a 4,500-ft. wildcat test to be drilled for Jack Stack and C. Porter in northwestern Lauderdale County, Mississippi. Location is for 1 Miles, in the E½ SE SE 2-7n-14e, 2 miles southeast of Collinsville.

J. F. Crow Well Servicing Co., Brookhaven, Miss., has taken on a 6,000-ft. drilling contract for a wildcat test located 3½ miles north of Kilmichael, Montgomery County, Mississippi. The test, 1 Townsend, in the C NW NE 20-19n-7e, is being drilled for Billups Brothers of Greenwood, Miss.

Quad Drilling Co., Shreveport, is starting its second exploratory test for Sneed Brothers of Shreveport on the latter's holdings in the Morgan City area of Leflore County, Mississippi. The new operation is 1 Fitz-Morgan, in the NE SW SE 33-18n-2w, 3 miles west of the town. It is contracted to 6,500 ft. The first test, located 4½ miles northwest, recently was quit as dry at 6,100 ft.

ACTIVE ROTARY RIGS*

(United States and Western Canada)

Area—	Week ended 6-2-52	Change week ended 5-26-52	Change week ended 6-4-51
Gulf Coast	627	— 7	+ 44
N. & W. Tex.-N.M.	976	—29	+104
Ark.-N. La.-E. Tex.	146	+ 1	— 15
Oklahoma	319	+ 7	+ 43
Kansas-S. Nebraska	186	+15	+ 10
Illinois-Eastern	150	0	— 8
Rocky Mountains	235	+ 6	+ 90
Pacific Coast	168	+ 3	+ 28
Total U. S.	2,807	— 4	+296
Western Canada	178	— 5	+ 49
Total	2,985	— 9	+345

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Gulf Coast and Arkansas - North Louisiana - East Texas areas are shown on pages 150 and 151.

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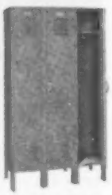

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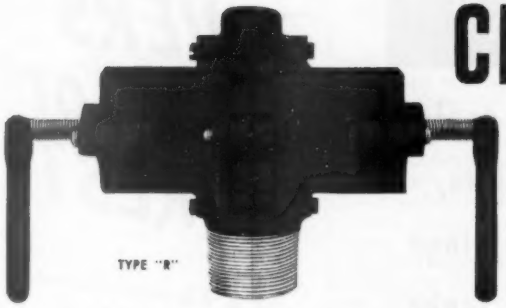
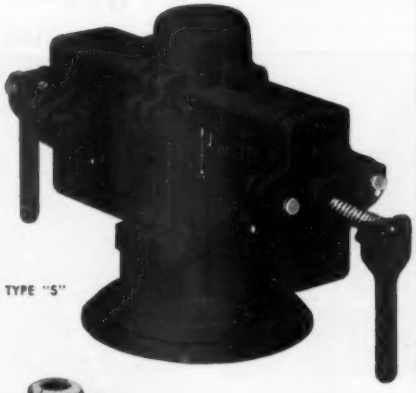


TYPE "R"



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Wire Line Oil Savers

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TYPE "R"—for tubing. Simple, inexpensive, effective. Split housing for easy installation.

TYPE "S"—for casing or tubing. Economical, simple—similar to "R" but heavier construction, flange bottom or tubing connection.

TYPE "D"—for tubing or casing. Two independent sets of rubbers, single end operation, make it cost more but still very economical. Pin or flange adapter connection.

Non-sparking brass bushings and guides throughout . . . long-wearing rubbers . . . finest Guiberson precision construction.

TYPE "B" RELEASING ATTACHMENT—Positive release for Oil Savers—prevents tool damage, necessity for flagging line. Easy to attach, pressure won't release it.

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. . . Your first line of defense against Corrosion on Pipe, Pipe Joints, Couplings and Tanks

TAPECOAT requires no foreign adhesive to bond it to surfaces as the coal tar serves as both bond and protection.

*Reg. U. S. Pat. Off.

Underground or above ground, TAPECOAT withstands severe corrosive attack. Over the past 11 years, this original coal tar protection in handy tape form has proved its dependability in guarding against moisture, acids, alkalis, chemical fumes and other severe conditions. As your first line of defense, TAPECOAT assures greater protection, reduces maintenance and cuts pipe replacement cost.

TAPECOAT is quick and easy to apply with the use of a torch to bleed the coating and insure a perfect bond. It is sized to the job in widths of 2", 3", 4", 6", 18" and 24". Wrapping is done spirally with widths up to 6", and "cigarette-wrapped" in the larger sizes.

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PIPE LINES

Capacity Sought

Tennessee Gas seeking o.k. on $44,700,000 expansion

HOUSTON.—Tennessee Gas Transmission Co. is seeking authority to expand its pipe-line facilities to the tune of about $44,700,000 in order to carry 66,000,000 cu. ft. of natural gas per day from the Southwest to Canada for Niagara Gas Transmission, Ltd., of Toronto, Ont.

The program would involve laying 107 miles of line paralleling the company's existing system in parts of Texas, Louisiana, Kentucky, Ohio, and Pennsylvania; laying a 45-mile spur line from its main line near Buffalo, N. Y., to the international boundary north of Niagara Falls; and installing compressor units with 132,000 additional horsepower.

The latter phase of the program would include construction of six new stations—one near Findley Lake, N. Y., and the other five at midpoints between existing stations from near Monroe, La., to near Portland, Tenn.

In connection with the spur line, Tennessee would build an aerial suspension bridge across the Niagara River north of Niagara Falls.

Tennessee's application was in support of applications for the same project filed earlier this year by it and Niagara Gas.

Niagara Gas would buy the gas from producers in fields in the Southwest near Tennessee's system. Tennessee would merely carry it to the international boundary for Niagara to resell in Toronto and other eastern Ontario markets.

Hearing Set on Expansion Plans of Eight Columbia Firms

WASHINGTON.—The Federal Power Commission has scheduled a hearing for June 23 on proposed expansion of service and facilities of eight subsidiary companies of Columbia Gas System, Inc., and three more firms seek-

Promoting Safety Pays

H. C. Price Co., Bartlesville, Okla., earned a certificate of honor from the Joseph A. Holmes Safety Association in 1951 by reducing its accident-frequency rate from 158.4 to 43.7 per million man hours worked. Receiving the certificate for the company recently is Harold C. Price, president, second from left. Representing the Bureau of Mines, sponsors of the safety association, and presenting the award, is Albert A. Munsch. At left is Bennie G. Pierce, safety director for Price, and at right is John M. Thomas, vice president of the company's pipe-line division. The Holmes safety association was organized by the nation's leading technical societies and mining organizations to interest both employers and employes in safety promotion. Named after Joseph Austin Holmes, a leader in the safety movement and first director of the Bureau of Mines, the association awards honor certificates to operating companies that have achieved outstanding records in safety.

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Pipeline crews really *roll* when they start coating with Pitt Chem Modified Enamel. That's because every ton of this impervious protective coating provides the same peak application characteristics and excellent bond as the last. Pitt Chem Modified Grade heats up faster, flows better from kettle to pipe and coats more pipe per ton because of its consistent top quality.

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ing gas supplies from Columbia affiliates.

The proposals are:

1. Atlantic Seaboard Corp., Charleston, W. Va., seeks removal of an FPC order limiting deliveries to Consolidated Gas Electric Light & Power Co. of Baltimore to 70,000,000 cu. ft. per day and authority to add compressor horsepower on its system to increase delivery capacity about 25,400,000 cu. ft. daily.

2. Virginia Gas Transmission Corp., Charleston, asks removal of an order limiting deliveries to Commonwealth Natural Gas Co., Richmond, Va., to 55,000,000 cu. ft. of gas daily.

3. Ohio Fuel Gas Co., Columbus, five applications for authorization of additional pipe-line facilities on its system in Ohio.

4. Manufacturers Light & Heat Co., Natural Gas Co. of West Virginia, and Home Gas Co., all of Pittsburgh, jointly seeking authority to lay and operate about 94 miles of lines on their systems in Ohio, Pennsylvania, and New York.

5. Central Kentucky Natural Gas Co., Charleston, seeking new facilities to increase deliveries to the Cincinnati area by about 85,000,000 cu. ft. of gas per day.

6. United Fuel Gas Co., Charleston, seeking an o.k. on construction of underground-storage and pipe-line facilities to insure adequacy and continuity of service to present markets.

The three firms seeking supplies of gas from Columbia companies are Shenandoah Gas Co., Lynchburg, Va. (from Virginia Gas Transmission); Peterstown Gas Co., Inc., Peterstown, W. Va. (from Atlantic Seaboard); and Rockland Light & Power Co., Nyack, N. Y. (from Home Gas).

Chicago District Pipeline To Lay Big-Inch Gas Line

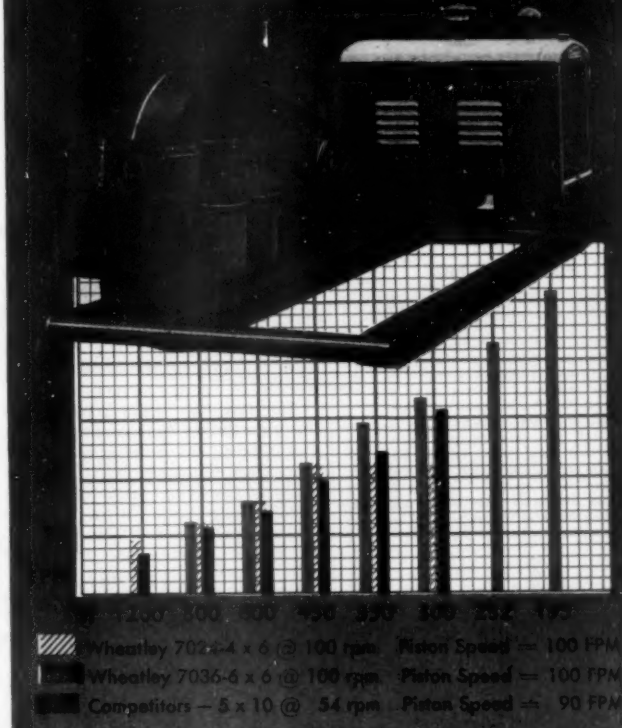
WASHINGTON. — Chicago District Pipeline Co., Joliet, Ill., has been authorized by the Federal Power Commission to lay a 12½-mile, 30-in. line in Cook County, Illinois, to carry gas for Public Service Co. of Northern Illinois, Chicago.

The $1,650,000 line will connect with Texas Illinois Natural Gas Pipeline Co.'s system near Elgin, Ill., and extend east to a connection with Public Service's system in Oak Grove Township, Cook County. Deliveries are estimated at between 35,000,000 and 66,000,000 cu. ft. of gas per day.

When more gas is available, Chicago District plans to loop and extend the line about 13 miles farther east. Its capacity then would be about 523,000,000 cu. ft. per day.

WHEATLEY'S new 6 x 6 PUMP EQUALS COMPETITOR'S 5 x 10 AND SAVES 30% INVESTMENT

Compare Wheatley's 6" Stroke with Competitor's 10" Stroke
MORE PRODUCTION FOR LESS MONEY


Wheatley 702-4 x 6 @ 100 rpm. Piston Speed — 100 FPM
Wheatley 7036-6 x 6 @ 100 rpm. Piston Speed — 100 FPM
Competitors — 5 x 10 @ 54 rpm. Piston Speed — 90 FPM

FEATURES

● 3¾" Face Herringbone Gear ● 2300# Weight
● 6.33 sq. in. Valve Area ● Crank Pin 3½" Diameter 3" Base
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Tennessee Awards Contract For 80 Miles of Ohio Loops

BARTLESVILLE, Okla.—Tennessee Gas Transmission Co., Houston, has let contract to H. C. Price Co., of this city, for construction of 80 miles of 26-in. looping in two sections along its main line in Ohio.

Contract covers 24 miles of line starting north of Carrollton, Ohio, and extending southwest into Harrison County and 56 miles starting northeast of Athens and extending southwest into Jackson County.

Right-of-way clearance and pipe laying already are under way. A Price spread under G. A. Reutzel has been moved from Auburn, N. Y., to Carrollton to handle construction.

Carolina Natural Proposes North Carolina Gas System

WASHINGTON.—Carolina Natural Gas Corp., of Charlotte, N. C., already engaged in an expansion of its pipe-line facilities, has filed an application with the Federal Power Commission for permission to lay on additional 40 miles of transmission line to supply natural gas to Rock Hill and other markets in South Carolina.

The new line would connect with the main line of Transcontinental Gas Pipe Line Corp., Houston, at a point near Kings Mountain, N. C., and extend to Rock Hill. Lateral lines would branch off to York, Clover, and Fort Mill, S. C., and Celanese Corp. of America's Celriver plant near Rock Hill.

Carolina Natural plans to purchase or build distribution systems in these communities.

Peak day demand on the proposed system is estimated by the company to range from 2,220,000 cu. ft. in the first year of operation to 6,141,000 cu. ft. in the fifth year. Cost is estimated at $3,150,000, including cost of the distribution system.

Carolina Natural now is carrying out an expansion of pipe-line facilities to serve gas to several North Carolina communities under FPC authorization. Sales have not yet begun.

Transco Case Separated

WASHINGTON.—The Federal Power Commission will consider and decide as a separate case the issue of whether Transcontinental Gas Pipe Line Corp., of Houston, should be relieved of any obligation to deliver 64,000,000 cu. ft. of gas daily to Northeastern Gas Transmission Co. in New England as previously authorized by FPC.

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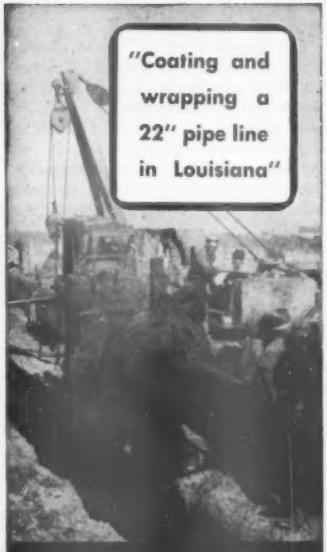

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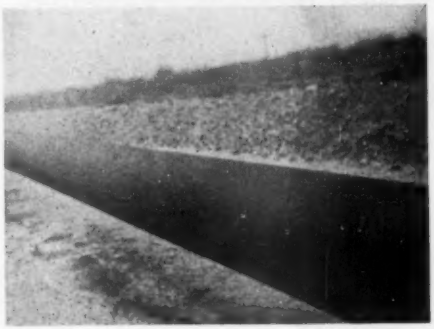
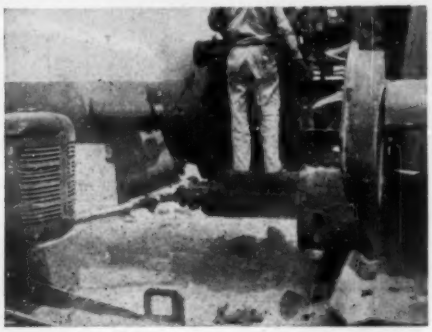
A NICOLET DEVELOPMENT — TO OBTAIN GREATER ROLL LENGTHS





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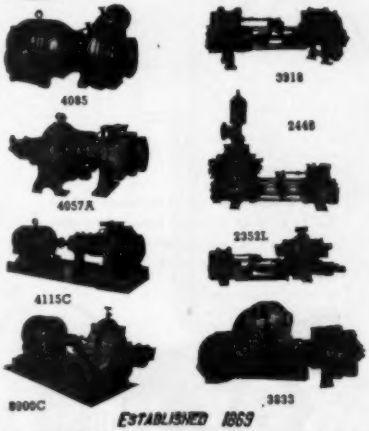

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- Lower unit cost.
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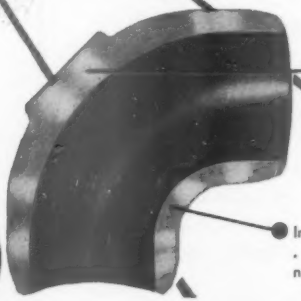
New bulletin KS-1 gives complete details how Key-Kast Welding Fittings can give your alloy piping system longer life at lower cost! Wire or write for your copy.



- Greater allowance against corrosion and erosion . . . with extra thickness in critical areas.
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REFINING

Decade of Cracking

First fluid unit rounds out 10 years of operation

BATON ROUGE. — The first commercial fluid catalytic cracking unit this week rounded out 10 years of operation.

When placed on stream here during the early part of the war by Esso Standard Oil Co., the unit's capacity was rated at 13,300 bbl. per day of gas-oil feed. Within 10 days, it was operating above design capacity, and its capacity has been increased periodically to the present 32,000 bbl. per day—240 per cent of original design.

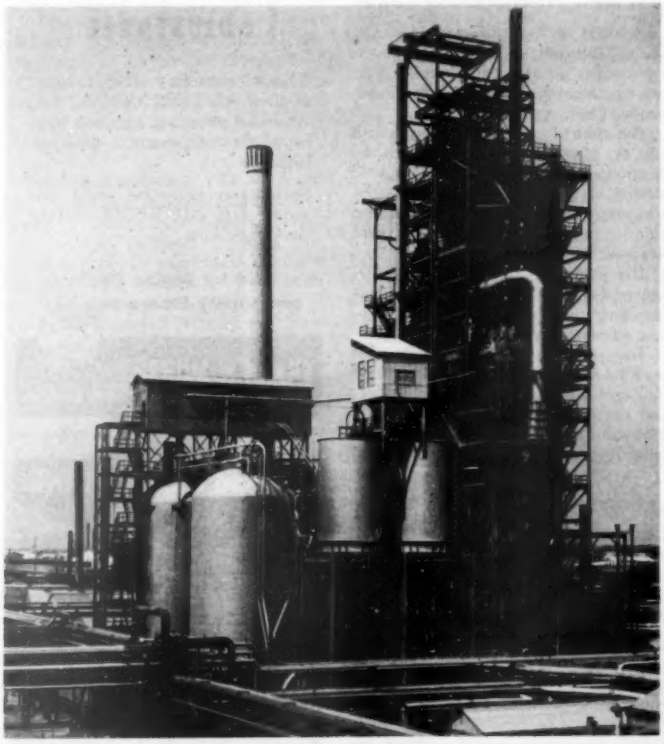
Following the original unit closely, Esso's No. 2 and No. 3 fluid units at Baton Rouge went on stream in 1943. These units, rated originally at 15,500 bbl. per day each also have seen substantial capacity increases.

No. 2 unit, on May 4, 1952, processed 56,600 bbl. of feed. On April 28, No. 3 unit completed a run of 2 years and 40 days during which 35,050,000 bbl. of gas oil was processed at an average rate of 45,500 bbl. per day.

These early units resulted from research development and engineering conducted by Standard Oil Development Co.

During the past 10 years, a total of 73 fluid cat units have been built in the United States, aggregating 2,000,000 bbl. per day in capacity. Eleven fluid units have been installed in foreign refineries.

By 1954, S.O.D. estimates that total domestic capacity for fluid catalytic cracking facilities will reach about 2,400,000 bbl. per day. Last year an estimated $40,000,000 worth of fluid cracking catalysts was used in refineries, which makes the industry the nation's leading catalyst consumer.



50,500,000 BBL. of gas oil has been processed in this first fluid catalytic cracking unit since it was placed on stream 10 years ago at Esso Standard's Baton Rouge refinery.

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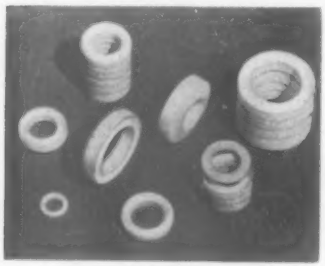
SOLID TEFLON GASKETS. Style E-9

Available as ring or full face for standard flanges, or die cut for odd shapes in thicknesses of 1/32", 1/16" and 1/8". Tolerances: Inside dia. —0, +1/16"; Outside dia. +0, —1/16".



TEFLON VEES. Style 73

Ideal for valve stem packing and rod packing for reciprocating and rotary pumps. Teflon's low coefficient of friction, combined with the design of these VEES, assures low turning torque as well as a sure seal with minimum pressure. VEES are unaffected by temperatures from —90 deg. F. to 450 deg. F.

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Gulf's New Ethylene Plant Delayed at Least 50 Days

PORT ARTHUR, Tex.—Gulf Refining Co.'s big ethylene unit will not be placed in operation until at least 50 days after the scheduled completion date due to work stoppages during the recent strike, a Gulf official said last week.

The new unit, with a 530,000-lb. production capacity, was scheduled to be completed this spring, but now cannot be put in operation before September at the earliest, he said. The resulting disruption in construction plans probably will prolong operation even longer, the official said.

Directly affected are four Gulf Coast petrochemical plants which have contracted to take ethylene from Gulf through the first ethylene pipe line. The plants are those of Monsanto Chemical Co. at Texas City, Tex.; E. I. du Pont de Nemours & Co., Inc., at Houston; Koppers, Inc., at Port Arthur; and Ethyl Corp. at Pasadena, a suburb of Houston.

California Standard Fitting Out New Fractionating Tower

EL SEGUNDO, Calif.—Standard Oil Co. of California is putting the finishing touches on a recently erected 270-ton fractionating column at its El Segundo, Calif., refinery.

The column, 10 ft. in diameter and 200 ft. high, is being fitted with 80 fractionating trays and 24,000 bubble caps. It is a major component of the company's new $10,000,000 benzene plant scheduled for completion here this year.

The plant will turn out 13,000,000 gal. of benzene a year and will boost the company's output of aviation gasoline substantially.

The tower was fabricated in two sections and hauled to the refinery on flat cars. The sections were welded, and the tower raised into position on a concrete foundation. The lifting operation required 2 hours and 20 minutes.

Jefferson Producing New Petrochemical Intermediate

NEW YORK. — Jefferson Chemical Co., Inc., New York, has announced the manufacture of pilot-plant quantities of a new petrochemical, ethylene carbonate.

The new chemical is an odorless, colorless, low-melting solid which is nonhygroscopic and noncorrosive.

It is reported by Jefferson to have outstanding properties as a solvent for acrylonitrile polymers, lignin, nitrocellulose, nylon, cellulose acetate, and other polymeric materials. It is also valuable in hydroxyethylation where equipment for handling gaseous ethylene oxide is not available.

Ethylene carbonate reacts with aliphatic amines to form carbamates (urethanes), and this comprises a new intermediate for the synthesis of agricultural chemicals, resins, fungicides, pharmaceuticals, and plasticizers. Samples and technical bulletins covering its properties now are available to laboratories through Jefferson's Market Development Division, 260 Madison Ave., New York 16, N. Y.

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DEPENDABLE
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These switches shut down engine AUTOMATICALLY when oil pressure gets too low, or water temperature gets too high.

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NATURAL GAS

RICH GAS PROPERTIES changing hands in the transaction are located in Duval, McMullen, and Live Oak counties (shaded area on map) along South Texas' Wilcox Trend.

Reserves Pact

Texas Eastern, Delhi Oil agree on big leasing deal

SHREVEPORT, La.—Texas Eastern Transmission Corp. has entered into two contract agreements with Delhi Oil Corp., of Dallas, for development of natural-gas reserves in the updip Eocene Wilcox strata of the Gulf Coastal Plain. More than $7,500,000 is involved in the agreements.

South Texas reserves . . . Development of natural-gas properties owned by Delhi in Duval, McMullen, and Live Oak counties in South Texas is contemplated in one agreement whereby Texas Eastern contracted with Delhi for the purchase of 8,800 acres of partially developed leases. On these tracts are 17 completed gas wells with combined proved reserves estimated to exceed 200 billion cubic feet (see map).

Purchase will be made by either Texas Eastern, or its wholly owned subsidiary, Texas Eastern Production Corp., which will develop undrilled acreage included in the transaction. Oil and gas leases involved are located in the Hagist Ranch, Rhode Ranch-Wilcox, Maxine, and Loma Alta-Wilcox fields. Rights conveyed cover only natural-gas production from the surface down through the Wilcox, the present principal producing formation in the area.

Gas will be transported by Wilcox Trend Gathering System, Inc., for delivery near Provident City, Tex., to the main pipe lines of Texas Eastern Transmission Corp. *(The Oil and Gas Journal, June 2, 1952, page 133).*

Reacquirement clause . . . The purchase agreement also provides that after Texas Eastern has recovered, after operating costs, the initial purchase price plus its capital investment in additional development with interest, Delta will reacquire a one-half interest in the properties. Texas Eastern's cash consideration in this agreement with Delhi is reported to be $6,500,000.

New reserves . . . A separate agreement was also consummated between Texas Eastern and Delhi under which the two companies will spend $1,000,000 in a joint exploration and development venture in eight South Texas counties.

Texas Eastern reserves the right to purchase any gas discovered.

Tidelands try . . . Texas Eastern extended its drive for reserves in still another direction with the announcement that Texas Eastern Production has negotiated a farmout agreement with a group of companies holding acreage in the Gulf of Mexico about 7 miles off Galveston's West Beach in Texas.

The company will try to bring in the state's first real "tidelands" production on a farmout from Stanolind Oil & Gas Co., Ohio Oil Co., and Melben Oil Co. on acreage drilled jointly by these firms in 1949. Two tests were drilled on the leases that year from a stationary platform with Stanolind as operator. One was completed at 5,950 ft. as a shutin gasser, the other was dry at 10,540 ft. Texas Eastern plans to use Stanolind's platform in drilling its first test.

Texas Panhandle Gas Price Up 25 Per Cent in Past Year

AUSTIN.—Prices for gas produced in the Texas Panhandle are up about 25 per cent over a year ago.

The average price for sweet gas delivered at 16.4 psi. is 6.3009 cents per M.c.f., it was developed at the recent Texas Railroad Commission hearing in Amarillo. A year ago the figure was 4.8526 cents per M.c.f.

Gas delivered at 14.65 psi. averages 5.6286 cents, compared with 4.3348 cents last year.

The Railroad Commission holds a hearing semiannually just to determine average prices—it does not fix prices to producers. Sour (high-sulfur-content) gas is figured to be worth about ½ cent per M.c.f. less than sweet gas. The ½ cent is approximately the cost of desulfurizing gas to make it acceptable to pipe lines.

The 25 per cent rise in price in the past year is one of the sharpest in the last 10 years, during which time the price paid for Panhandle gas has nearly doubled.

87 Companies Report March Sales Reach 241,000 M.M.c.f.

WASHINGTON. — The tremendous surge in popularity of natural gas as a fuel was emphasized in March, as sales to ultimate consumers by natural-gas companies reporting to the Federal Power Commission reached about 241 billion cubic feet, up 14.3 per cent from March 1951.

In the same month, demand for liquid products increased only 0.8 per cent over March 1951.

Sales of natural gas to residential and commercial consumers increased 16.8 per cent and 18.1 per cent, respectively, while those to industrial consumers were 11.1 per cent higher.

Revenues from sales gained 13.3 per cent to total $91,296,736.

Natural Gasoline

Tex Harvey Storage Project In Midland County Approved

AUSTIN.—Tex Harvey Gasoline Co. has been granted permission by the Texas Railroad Commission to store butane and propane in a 120,000-bbl. underground - storage project in Tex Harvey field, Midland County, Texas.

Products will be stored at about 2,050 ft. in four 30,000-bbl. cavities washed out of a 540-ft. salt formation.

The four wells will be drilled on the company's tank farm in Section 14, Block 37, Township 3 South, T&P Railroad Co. Survey, Midland County. Railroad Commission approval was contingent on the company's casing the wells so that products can enter no other formation except the salt strata, which is encountered in this area at about 1,560 ft. and topped by 20 ft. of dense cap rock.

In testimony before the commission, Clyde M. Keithly, Austin consultant, said the company expects a minimum 95 per cent recovery on reproduction.

In leaching out the cavities, Tex Harvey plans to circulate fresh water at a rate of about 2 bbl. per minute with a possible increase to 5 bbl. per minute in about 2 weeks.

Salt water, to be used in displacing L.P.G. on reproduction, will be stored in surface pits.

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Exploration and Drilling

Today's Promise of Geophysics

BETTER use of existing tools is the principal objective of geophysical thinking today in most of the oil provinces of this country.

There are "no good" reflection areas (such as parts of the Permian basin and the northern end of the Anadarko basin) where refinements in instrumentation might result in improved record quality, but in areas where fair to good reflections are the rule the instruments now available for the search for structural anomalies have reached a point where there is little to be desired. In these areas the quality of the instruments is ahead of interpretive ability, and the volume of instruments in use is ahead of the number of operators adequately trained to get the job done properly. Here the job of the geophysicists is to catch up with their instruments.

To "catch up" geophysicists are training all the qualified men they can get, constantly developing new approaches to old problems through the use of new techniques in the field and in the office, and coordinating all available oil-finding information.

The tremendous importance of the utilization of all kinds of geological information to improve geophysical interpretation was expressed by Morgan J. Davis at the Houston meeting *(see news section, Gulf Coast)* when he said: "There have been no radical or sensational discoveries in new finding methods. We still rely on the seismograph, gravity meter, and the magnetometer as our principal geophysical instruments. We supplement the information provided by them with data from surface work, core drilling, and subsurface interpretation. We have, however, learned to coordinate the results of all the different finding methods, and this is probably more important in most finding organizations than would have been the discovery of some new finding tool."

There has been such a tremendous volume of seismograph work done in this country that within the files of oil companies there are probably more keys to oil fields than will ever be found by new shooting. This data is being used, but not to the extent that it should be. A major part of these records are just as good for interpretation as those taken today. These old records are not buried because they do not offer sufficient accuracy of data—they've been buried because their entire value could not be utilized when they were first worked.

Oil fields can be found by reworking old records because of three obvious reasons: (1) more time can be given to individual records than was possible during the rush of shooting; (2) the entire picture of an area can be made available for study rather than a few loops here and there; and (3) velocity control is usually available from more holes than when the records were made.

A seismogram is still just a time record and additional velocity control from wells that have been drilled during the time that these records lay buried can make the difference between a low and a high in the conversion from time to structure maps. Oil fields are being found by working old records, many others could be found with more intensive use. More records should be exhumed and reworked with the advantages not available to the first few men who studied them.

Detailing by gravity meter is an example of a long-neglected geophysical art that is being given a great deal more emphasis lately. The clumsy torsion balance, forerunner of the modern gravity meter, found many of the big producing salt domes on the Gulf Coast as well as many other domes which have yet to produce. However, as the search for oil spread out and the "thermos bottle" gravity meters were developed, this valuable anomaly finder was assigned to reconnaissance work. Detail work by gravity meter was neglected for about 15 years. Both Sigmund Hammer and L. L. Nettleton have recently presented papers on the excellent results obtained by detailed use of gravity meters in reviewing salt domes.

Scientific oil finders of today aren't pinning their hopes on some new method for finding oil, but rather on coordination and "milking dry" of the information and data on lithology, stratigraphy, and structural studies of sedimentary and basement rocks from all methods considered sound. In geophysics it's the "geo" that's due for study because it's the inexact science of geology that is confusing the exact science of physics.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WYOMING . . . Gulf Oil Corp. has finaled its deep Phosphoria discovery southwest of Worland for an estimated 1,385 bbl. of distillate daily, with 12,000,000 cu. ft. of gas. J. Ray McDermott & Co.'s second well in Ash Creek, Sheridan County, is a commercial success, confirming the county's entry into the list of Wyoming producers. McDermott's discovery is the northernmost producer in the Wyoming portion of the Powder River basin. Production is from Shannon.

TEXAS PANHANDLE . . . Gulf Oil Corp. 2 Haggard, Roberts County discovery, flowed 239 bbl. of 47°-gravity oil, plus 8 bbl. of basic sediment and water, in 12 hours through ¾-in. choke. Production was from bottom 20 ft. of the Wichita Albany pay to 4,037 ft. Gas-oil ratio was 6,921 to 1.

WEST TEXAS . . . Standard of Texas 1 Minnie Adams, Floyd County discovery, unloaded oil following a test at 7,598-7,622 ft. It indicated 13 ft. of additional pay in coring to 7,637 ft., then recovered 1,800 ft. of mud-cut oil on drill-stem test. Pay section was believed to be lower Strawn.

Texas Gulf Coast

Potential Reported on New Jasper County Strike

HOUSTON. — American Republics Corp. and Houston Oil Co. of Texas have reported potential on a new oil discovery in Jasper County to be designated as West Castillo 12 Yegua field. The discovery is 1¾ miles northeast of Buna field and 1½ miles west-southwest of Bessmay field.

On initial potential test well flowed 68.5 bbl. of 44.8°-gravity oil per day on 6/64-in. choke through 12 casing perforations at 7,620-22 ft. Tubing pressure gaged 1,190 psi. and casing pressure was 600 psi. Gas-oil ratio registered 1890-1. Top of pay was called at 7,614 ft. Hole is bottomed at 8,152.5 ft. with 5½-in. casing cemented to 7,674 ft. and 2-in. tubing swung at 7,600 ft.

Hamman Oil & Royalty Co. has completed 3 Frank Weidel et al in a new pay section on the Arnim "B" sand, 4½ miles southwest of Muldoon in Fayette County. Completion was effected opposite 18 casing perforations at 2,290-93 ft. and on initial potential test flowed 66.91 bbl. of 21°-gravity oil per day on 9/64-in. choke with tubing pressure of 275 psi. and casing pressure of 880 psi.

Hole is bottomed at 2,304 ft. with 7-in. casing at total depth and 2⅞-in. tubing at 2,289 ft. The 3 Weidel is the second well in the field to be completed in the sand. Operator's 5 Weidel, also completed in this pay, is shutin as a gas well.

Brazos Oil & Gas Co. is testing through perforations at 11,097-11,108 ft. in the 1 W. A. Struss, Colorado County wildcat 3 miles south of Altair field production and 2¼ miles northwest of Englehart field. Operator bottomed the hole at 11,108 ft. and cemented 7-in. casing to total depth.

Claud B. Hamill has staked the 1 R. R. Kropp et al as an 800-ft. wildcat in the Clemens Dome area of Brazoria County, 4½ miles south of Brazoria and 3,500 ft. southeast of his 2 Texas Gulf Sulphur gas well. The 2 Texas Gulf Sulphur was completed for 2,500,000 cu. ft. of gas per day on absolute open flow through perforations at 1,160-65 ft. Other attempts to establish production in the field have failed including three deep tests from 6,000 to 6,500 ft.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Brazoria County: Gas-condensate discovery at Flag Pond. Superior Oil Co. 1 Mae C. McDonald, Zeno Phillips Sur., A-118, Lot 4, TD 10,423 ft., lower Frio 10,363½-91½ ft., and 10,014-28 ft., IP 82,000,000 cu. ft. of gas per day plus some 64.5°-gravity distillate.

DeWitt County: Oil discovery. Kirkwood & Morgan 1 W. A. Bell, F. R. McConnell Sur. 2, A-440, TD 8,115 ft., Wilcox 7,959-60 ft. IP 130 bbl. oil per day, 33.4° gravity, TP 1,850 psi.

Jackson County: Oil discovery. Sam G. Harrison 1 W. E. Boehm, John Davis Sur., A-16, TD 6,765 ft., perf. 6,319-24 ft. IP 32 bbl. oil per day, 10/64-in. choke, TP 75 psi.

Liberty County: New pay at South Dayton. The Texas Co. 4 William Duncan Welder, William Duncan Sur., TD 8,943 ft., perf. Vicksburg 8,094-8,140 ft. IP 273 bbl. oil per day, 12/64-in. choke, 36.7° gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Austin County: The Texas Co. 1 H. W. Hackfield NCT 1, Stephen F. Austin League, A-4, dry, TD 11,014 ft.

Bee County: Gasoline Production Corp. 1 Rosa E. Borroum et al, Charles Baker Sur., A-112, dry, TD 6,690 ft.

Burleson County: Morris K. Womack 1 W. H. Jenkins et al, W. C. Pierce Sur., A-297, dry, TD 6,430 ft.

Galveston County: Hassie Hunt Trust 1 Mike David, Lemuel Crawford Sur., A-48, dry, TD 12,515 ft.

Grimes County: Standard Oil Co. of Texas 1 W. S. Brown et al, Obedience Hill Sur., A-254, dry, TD 10,770 ft.

Jefferson County: Blairsville Machine Products Co., Inc., 1 K. S. Hennessy, T&NO RR Co. Sur., 189, dry, TD 11,008 ft.

Karnes County: Dunlap & Corning 1 Vicint Lyssey, Bartlett Hickman Sur., A-35, dry, TD 4,074 ft.

Liberty County: F. A. Callery, Inc., 1 J. M. Heiskell Est., Joseph Dugat League, A-175, dry, TD 8,606 ft.

Live Oak County: Humble Oil & Refining Co. 1 T. R. Coker, N. C. Anderson Sur. 17, dry, TD 10,000 ft.

Montgomery County: Carnes W. Weaver 1 W. D. Cleveland Est., William Massey ½ League, dry, TD 8,713 ft.

Wharton County: H. J. Chavanne, Trustee 1 Edward Popp et ux, J. J. Dillard Sur., A-18, dry, TD 6,515 ft.

North-Central Texas

Parker County's Peel Field is Extended

WICHITA FALLS.—An extender for the Peel-Caddo field of northeast Parker County was completed by H. A. Hedberg as his 1 Lula McCracken. Top of pay was 3,764 ft. on elevation of 938 ft. and completion on the pump was 103.3 bbl. of 39°-gravity oil. Total depth was 3,874 ft.

Information was withheld on the same operator's 1 Leonard Hinkle, about ½ mile to the southeast of the McCracken well, but reports indicated the well had oil and gas shows near its total depth of 3,892 ft., in the Caddo. The well was acidized and shut in for orders.

Russell Maguire staked location for 1 Whitehead as a 7,200-ft. wildcat to be drilled 4½ miles northwest of Sunset in Montague County in the W. Bond Survey. Nearest deep production is 4 miles to the west.

Montague County drilling wells included Bay Petroleum Corp. 1 Johnson, R. T. Biggar Survey, drilling in shale at 4,910 ft. Jack Grace 1 Arami, James Gibbons Survey, drilling at 6,309 ft. The Texas Co. 1 Egenbacher, Section 80, Hill CSL Survey, was drilling below 6,882 ft.

In Clay County Bridwell Oil Co. 1 Henry Sanzenbacher, wildcat 3 miles southeast of Blue Grove, was drilling ahead following a 30-minute drill-stem test at 3,232-42 ft. Recovery was 30 ft. of oil-cut mud.

Frank Wood 1 Viola Myers, wildcat 3 miles southwest of Henrietta, was drilling in sand at 4,954 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: Timberlake, Kelleher & Scott 1 Prideaux-Hand, J. J. Hand Sur., TD 2,873 ft., pay 2,861 ft., IP 180 bbl. 42°-gravity oil, ¼-in. choke, TP 100 psi., GOR 400 cu. ft.

Shackelford County: Jackson M. Smale 1 W. H. Green, 71-12-T&P, TD 984 ft., pay 965 ft., IP pumped 33 bbl. 38°-gravity oil.

Stephens County: Terrell Petroleum Co. 1 L. C. Link, 25-6-T&P, TD 4,550 ft., elev. 1,434 ft., Ellenburger 4,317 ft., perf. 4,320-46 ft., IP 31,000,000 cu. ft. gas.

Throckmorton County: Mobile and Roberts 1 W. L. Everett, Sec. 1,622, TE&L, TD 4,296 ft., elev. 1,384 ft., pay 2,865 ft., IP 337 bbl. 38°-gravity oil, 12/64-in. choke, TP 80 psi., GOR 421 cu. ft.

Woodson Oil Co. 3 Brown-Condron-Davis unit, Acct. 2, Sec. 1,620, TE&L Sur., TD 3,455 ft., pay 3,428 ft., IP 78 bbl. 40°-gravity oil, 21/64-in. choke, TP 100 psi., GOR 725 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: J. P. Horany 4 Olin Calvin, H. Grooms Sur., dry, TD 960 ft.

The Texas Co. 1-F Wilson, Grayson CSL, A-739, dry, TD 3,961 ft.

Callahan County: R. W. Bradley and Trinity Production Co. 1 F. L. Martin, Sec. 17, BAL Sur., dry, TD 2,136 ft.

Woodson Oil Co. 3 R. L. Berry, Sec. 70, BAL Sur., dry, TD 1,182 ft.

Coleman County: Cole and Chamberlain 1 Taylor, A. S. Lipscomb Sur. 77, dry, TD 1,180 ft.

Murray and Collins 2 Dick Hamon, J. H. Gibson Sur., dry, TD 3,511 ft., elev. 2,068 ft., Jennings 3,260 ft., Fry 3,182 ft., Gardner 3,360 ft.

Pure Oil Co. 1 A. R. Berryman, Burnett CSL 703, dry, TD 3,425 ft., Gardner 3,184 ft., Caddo 3,340 ft.

Gary Wright 2 J. T. Blair, 20-1-GH&H, dry, TD 2,570 ft., Home Creek 1,809 ft., Morris 2,566 ft.

W. J. Weaver Trust 1 J. L. Ray, E. Boggs Sur., 108, dry, TD 3,500 ft., elev. 1,934 ft., Morris 3,135 ft., Jennings 3,275 ft.

Eastland County: W. B. Haminton 1 Mrs. J. F. Penn, 11-2-BBB&C, dry, TD 4,308 ft., elev. 1,714 ft., Lake sand 3,612 ft., Mississippian 4,111 ft., Ellenburger 4,152 ft.

Fisher County: Humble Oil & Refining Co. 1 Celia McGree, 69-1-HT&B, dry, TD 6,012 ft., elev. 1,951 ft., Canyon 4,601 ft., reef 5,228 ft., Bend 5,392 ft., Mississippian 5,580 ft., Ellenburger 5,980 ft.

E. C. & M. O. Johnson 1 Holman, E. S. English Sur., dry, TD 5,595 ft., elev. 1,779 ft., Flippen 3,112 ft.

Moutray-Moore Drilling Co. 1 B. F. Kemp, 55-1-HT&B, dry, TD 6,207 ft., elec. 1,945 ft., Strawn 5,550 ft.

Haskell County: T. D. Humphrey 1 W. A. Montgomery, J. Husband Sur. 73, dry, TD 5,472 ft., elev. 1,504 ft., Mississippian 5,321 ft., Ellenburger 5,441 ft.

Jones County: C. U. Bay 1 Parham, Sec. 37, OAL Sur., dry, TD 2,858 ft.

Jones & Stasney 1 J. O. Amerson, Sec. 32, Austin & Williams Sur. 340, dry, TD 3,425 ft.

Lester & Duffield et al 1 L. Hedrick, J. M. Long Sur. 4, dry, TD 3,455 ft.

Montague County: George S. Engle 1 W. L. Eubank, Sec. 159, J. Archer Sur., dry, TD 6,390 ft., Caddo 5,740 ft.

Palo Pinto County: Palo Pinto Oil & Gas Corp. 3 A. D. Popp, 54-2-T&P, dry, TD 1,511 ft.

TA&M Oil Co. 1 A. C. Kendrick, M. Forrest Sur., A-177, dry, dry, TD 5,454 ft.

Parker County: J. W. Bartlett, Jr., 1 J. D. Jones, Samuel Riddle Sur., dry, TD 2,500 ft.

Stephens County: The Texas Co. 1 Leland Knight, J. T. Cornett Sur., dry, TD 4,475 ft.

Two Square D Oil 1 G. E. Williams, 13-6-T&P, dry, TD 2,927 ft.

Stonewall County: Humble Oil & Refining Co. 1 A. W. McCoy, 29-D-H&TC, dry,

TD 6,360 ft., elev. 1,637 ft., reef 4,718 ft., Strawn 5,342 ft.

Taylor County: Humble Oil & Refining Co. 8 Henry Salyes, Tract 9, J. Trussell Sur. 141, dry, TD 5,460 ft., elev. 2,101 ft., TD in Ellenburger.

Republic Natural Gas Co. 1 William Stevens, 110-64-H&TC, dry, TD 5,219 ft., elev. 2,031 ft., Caddo 4,953 ft., Ellenburger 5,130 ft.

Throckmorton County: Ashland Oil & Refining Co. 1 J. D. Falls, Sec. 242, BHB&C Sur., dry, TD 4,759 ft., elev. 1,377 ft., Caddo 4,582 ft.

Young County: Dillard & Waltermire, Inc. 1 Allar-Hunt "B," Sec. 3,410, TE&L Sur., dry, TD 4,614 ft.

Sid Perryman 1 W. P. Easley, 225-A472-TE&L, dry, TD 1,045 ft.

Southwest Texas

Frio Sand Discovery Flows Gas-Condensate

CORPUS CHRISTI.—A. O. Phillips 1 L. M. Sanders et al, gas-distillate discovery in Aransas County, flowed 6 to 7 bbl. of oil per hour from perforations in the Frio B-5 sand at 7,182-98 feet on a 8/64-in. choke with 575 psi. tubing pressure. On previous perforations in the Frio B-2 sand at 7,116-28 ft., the well flowed 50,000,000 cu. ft. of gas per day on a 7/64-in. choke under 2,500 psi. working pressure. The gas-distillate volume is 40 bbl. per 1,000,000 cu. ft. of gas. Hole is bottomed at 8,154 ft. with 5½-in. production string cemented to 7,500 ft. Testing continues at site of operations.

About 6 miles southwest of Pearsall in Frio County, Midstates Oil Corp. 1 A. E. Malone potentialed 171 bbl. of 30°-gravity oil per day by heads on a ¼-in. choke. The well will be put on a pump, since it flows by heads. Completion was from open hole. Total depth is 5,870 ft. with 5½-in. casing cemented to 5,483 ft. Production is from the Austin chalk.

H. H. McFarland 2 Fannie B. Nason, an outpost 10 miles north of Banquette in Nueces County, was bottomed at 6,051 ft. and 5½-in. casing cemented to 5,950 ft. with 2-in. tubing run to 5,852 feet. Casing completion through perforations at 5,749-55 ft. was potentialed for 15,000,000 cu. ft. of gas per day on absolute open flow. Casing pressure registered 2,200 psi., and shut-in pressure was 1,500 psi. Tubing completion through perforations at 5,904-14 ft. was potentialed for 90 bbl. of 39.8°-gravity oil per day on a ¼-in. tubing choke. Gas-oil ratio was 800-1. Tubing pressure was registered at 100 psi. Location is on a 450-acre lease, Share 1-C Bluntzer Partition. McFarland failed to establish commercial production at the 1 Fannie B. Nason, 2,400 ft. southwest of the outpost.

La Gloria Corp. of Corpus Christi has an apparent new oil discovery at 1 H. G. Ritchie in San Patricio County. Information is very scarce on 1 Ritchie but it has been reported that 1,200 ft. of oil was recovered on a 19-minute drill-stem test of a section of sand around 8,700 ft. It also has been reported that several gas and distillate sands had been encountered in this well. Operator is preparing to set casing to 8,700 ft. Location is approximately 3 miles northeast of production in East Plymouth field, and 10 miles northeast of Taft.

The new gas-distillate discovery, 6 miles southeast of Runge in Karnes County, drilled as the 1 Rudolph Kruse by Brazos Oil & Gas Co. flowed at the rate of 2,814,000 cu. ft. of gas plus 99.31 bbl. of 60°-gravity distillate per day. Completions was made through perforations at 7,208-14 ft. with the top of pay being called at 7,208 ft. Hole is bottomed at 7,521 ft. with 5½-in. production string cemented to 7,274 ft. The name Pargman has been suggested for the field.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Atascosa County: Gas-condensate discovery. Lone Star Producing Co. 1 Mrs. Juan Leal, J. A. Gutierrez Sur., 1059, TD 8,195 ft., Edwards 8,142-53 ft. IP 183 bbl. oil per day, ¼-in. choke, TP 2,510 psi., 60.1° gravity.

Starr County: Oil discovery. Sun Oil Co. 1 LaBrisa Land & Cattle Co., Porcion 92, Tract 31, TD 6,505 ft., perf. 4,004-09 ft. IP 55 bbl. oil per day, 9/64-in. choke, 46.2° gravity.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Duval County: Jake L. Hamon, Edwin L. Cox, Geo. H. Coates A-1 Dagmar-Gruy, B. Gussett Sec. 28, A-1124, dry, TD 4,815 ft.

Duval County: Lockhart Oil Co. of Texas 1 James P. Luby Heirs, Adelaide Luby Whitman Subd., A-1985, dry, TD 6,030 ft.

Gonzales County: Forney & Winn 1 Anna J. Kinnard, Alexander Isbell Sur., A-286, dry, TD 6,499 ft.

Guadalupe County: Maple C. Hughes & I. L. Hebert 1 Virgil Holm, J. Cantus League, A-9, dry, TD 2,999 ft.

Jim Wells County: Magnolia Petroleum Co. 212 A. A. Seeligson, "Los Jaboncillos" A. Ramirez Grant, dry, TD 6,500 ft.

Jim Wells County: H. R. Smith 1 Gilbert F.

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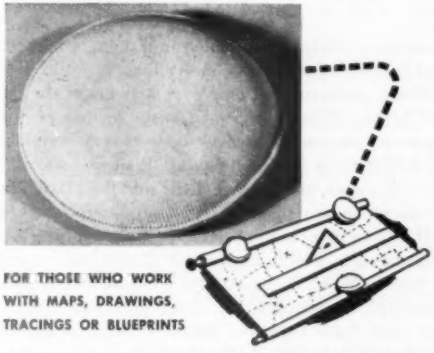

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The man with an objective is a better employee. He knows that a day lost from work is just that much out of his take-home savings. He doesn't take chances—wants to stay off the accident list. He has a new realization that better work on his part will lead to advancement—and a larger monthly allotment for Defense Bonds.

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THE OIL AND GAS JOURNAL
TULSA 1, OKLAHOMA

Vetters, Casa Blanca Grant, dry, TD 6,000 ft.

Jim Wells County: Texita Oil Co. & J. E. Hillier 1 W. A. Davis, T&NO RR Sec. 15, A-503, dry, TD 3,394 ft.

Milam County: J. F. McLaughlin 1 Seth Corley, J. A. de Pena Sur., dry, TD 3,552 ft.

Nueces County: George W. Graham et al, 1 August Benovsky, F. Z. Bishop S/D of Petronilla Ranch Sec. 10, dry, TD 7,551 ft.

San Patricio County: Geo. E. Farenthold 1 James T. Touchstone, George Morris League, A-19, Blk 24, dry, TD 6,506 ft.

Travis County: E. R. Marts 1 E. L. & Irma Robertson, Reuben Hornsby Sur., dry, TD 1,156 ft.

Zapata County: Hawn Bros. et al, 1 Rosa G. de Rodriguez, et al, Charco Redondo Grant, Share E, dry, TD 3,512 ft.

Louisiana-Ark.

Bienville Well Testing In New Travis Peak Sand

SHREVEPORT.—Pan Am Southern Corp. 1 W. H. Teasley, C NW NW SE 20-17n-6w, West Bryceland field, Bienville Parish, is drilling ahead at 7,818 ft. in Travis Peak sand. Operator recorded top pressure of 1,200 psi. on a 6-minute test from 7,615-27 ft.

The new pay discovery is southeast of the discovery well of West Bryceland field. The strike missed the producing sand in the discovery well. The field opener well also missed the new pay sand. The field discovery well is producing from Travis Peak at 6,917-24 ft., the first sand found in the Travis Peak.

Southwest Gas Producing Co. and W. C. Feazel have run log and are coring ahead at 1 Redwine in NE 11-17n-3w, southern Lincoln Parish wildcat.

Operators plan to deepen the hole and set production string to about 10,500 ft. in the Cotton Valley. Wildcat has shows of production at 9,698-9,726 ft. in basal Travis Peak (?).

Arkansas.—E. G. Bradham completed 3 A. T. Munday, 990 ft. east and 165 ft. north of SWc NE¼ 25-17s-16w, Union County, to pump 8 bbl. of oil daily.

Curtis Kinard is testing and installing pump at 1 Taylor, C SE¼ NE¼ NW¼ 28-18s-12w, Union County, after drilling to 6,400 ft. Operator made drill-stem test from 6,388-6,400 ft. and well flowed 1½ hours. Perforations were made at 6,394-96 ft. and squeezed, but squeeze job channeled.

Perforations have been made at 5,710-15 ft. in the Cotton Valley for testing before completion from that zone.

In Ouachita County, Jack Carnes is drilling below 4,425 ft. at 1 Taylor Daniels, C SE SE 23-14s-17w, after recovering 10 ft. of sand with spotted oil sand on core from 1,755-65 ft. A drill-stem test of the same zone recovered 30 ft. of slightly oil-cut mud.

W. G. Skelly is waiting for test at 1 Dickson heirs, NWc 36-19s-27w, Miller County, after swabbing 45 bbl. of oil daily from 6,822-34 ft. in the Pettit.

NORTH LOUISIANA WILDCAT FAILURES

Franklin Parish: D. E. Vasser et al 1 Lucille Black, 660 ft. N and 460 ft. W SEc SW NE 21-15n-7e, dry, TD 4,011 ft.

Saline Parish: Carter Oil Co. 1-A Esto-Wyatt Lumber Co., 410 ft. N and 1,000 ft. W SEc 9-5n-12w, wildcat core-test, plugged, TD 3,065 ft.

Tensas Parish: Union Oil Co. of California 2 Weathersly-Anderson, 662 ft. S and 1,999 ft. E. NWc 39-12n-12w, dry TD 8,937 ft.

Webster Parish: Carter Oil Co. 2 Nora Davis unit, 560 ft. S and 660 ft. W NEc 34-18n-8w, dry, TD 9,947 ft.

ARKANSAS WILDCAT FAILURES

Ashley County: Lion Oil Co. 4-A Crossett Lumber Co., SW SE 36-17s-6w, dry, TD 3,512 ft.

Ouachita County: Caddo Oil Co. 1-B Slaughter, estate, NE NW NE 23-14s-19w, dry, TD 2,344 ft.

Mississippi

Rankin County's Deep Well Tests Noninflammable Gas

JACKSON.—In the Goshen Springs area, Rankin County, the closely watched deep Smackover wildcat, Lion Oil Company 2 Denkmann, 22-7n-4e, recovered noninflammable gas from test of open hole below casing set to 15,773 ft.

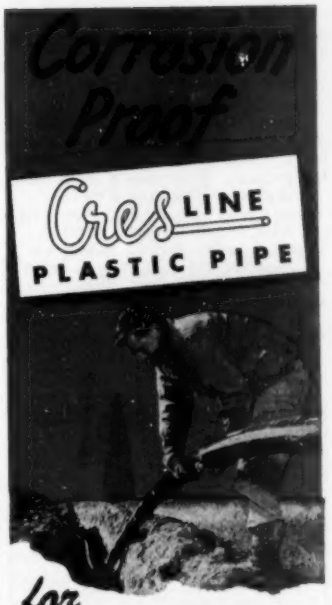
This test had been drilled and cored to total depth of 16,276 ft. when drill pipe stuck. Pipe was fished out to 15,781 ft. and 5-in. casing cemented to 15,773 ft. Cement was then drilled out and hole was conditioned to top of fish. Wire-line packer was set in casing at 15,715 ft. and then tubing was run in hole. The 14-lb. mud in the tubing was displaced with 11.8-lb. mud. Tubing was then set in the packer, but the well would not kick off.

The mud was then displaced with water and after some agitation the well started flowing the water cushion with 1,700 psi. tubing pressure. After 30 minutes the well was shut in over night. Shut-in tubing pressure was 3,400 psi. The well was then opened up and cleaned to pits on various chokes. It was necessary to leave it on ½-in. choke to keep it from plugging. A considerable amount of very viscous mud was produced along with the remainder of the water cushion before the noninflammable gas reached the surface. Tubing pressure had ranged from 2,000 to 2,850 psi. and shut-in pressure was 4,000 psi.

The well is still making a considerable amount of mud. Samples of the gas have been sent to the laboratory for analyses, but it is presumed that it is carbon dioxide such as had been tested from the sand section up the hole at 15,100 ft. Operators will probably kill the well and test the sand section at 15,585-15,704 ft.

In northern Scott County Southeastern Drilling Co. 1 Eley et al, 19-8n-8e, has been completed dry at total depth of 9,814 ft. in dolomite which is thought to be Knox. Electric log indicates top of this dolomite at 9,655 ft. (—9,272 ft). The log also indicates an unusual Cotton Valley section. Top of Cotton Valley was picked at 8,880 ft. by samples and 8,935 ft. by electric log. The section from 9,050 to 9,550 ft. appears to be almost entirely highly resistant shale. In most areas in Mississippi the Cotton Valley has been predominately sand.

The section from 9,550 ft. to top of the Knox appears to be reworked material. Sub-



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ject test was located only 6 miles up-dip (northeast) from a gravity minimum.

MISSISSIPPI WILDCAT FAILURES

Adams County: Don Reese 1 Edith E. Mingee et al, 18-8n-2w, dry, TD 6,055 ft.

Franklin County: F. H. Shortridge 1 Mrs. L. H. Halford, 23-5n-2e, dry, TD 7,007 ft.

Jones County: V. A. Brill 1 H. C. Smith et al, 8-7n-13w, dry, TD 8,760 ft.

Marion County: Deep Rock Oil Corp. 1 John Allen, 14-3n-13e, dry, TD 10,517 ft.

Scott County: Southeastern Drilling Co. 1 Lucye D. Eley et al, 19-8n-8e, dry, TD 9,810 ft.

Warren County: Deep Rock Oil Corp. 1 H. H. Henry, 22-7n-4w, dry, TD 8,590 ft.

Wilkinson County: Gulf Refining Co. 2 Edna W. Sessions et al, 29-3n-3w, dry, TD 7,650 ft.

Rocky Mountain Maps

Sectionized production maps showing oil fields in green, gas fields in red with official field names. Sections, townships, ranges and county seats. Drilling wells and dry holes with total depths.

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FLORIDA WILDCAT FAILURE

Escambia County: Sunnyland Contracting Co. 1 McMillan Co.-M. L. Eubanks, 3-4n-32w, dry, TD 6,992 ft.

Rocky Mountain

Significant Big Horn Basin Wildcat Completed

DENVER.—Gulf Oil Corp. has completed its 1 Stockham-Federal, C SE NW 2-46n-94w, significant oil discovery well in Washakie County, Wyoming. The well flowed 572 bbl. of 45°-gravity distillate, and gas at the rate of 12,000,000 cu. ft. daily, during a 10-hour and 52-minute test on 52/64-in. choke. Production is from open hole in Phosphoria between 12,905 and 13,000 ft. The test followed acid treatment with 6,500 gal. Daily potential is estimated at 1,385 bbl. of distillate.

The discovery is about 30 miles south of a joint discovery by Husky Oil Co., and Wilshire Oil Co. in the Five Mile area of Big Horn County, which was rated at more than 40,000,000 cu. ft. of gas per day through open 2-in. tubing. The gas carried 50 bbl. of distillate per 1,000,000 cu. ft.

A confirmation effort by J. Ray McDermott and Co., who's recent wildcat success in the Ash Creek area of Sheridan County put that county among Wyoming producers, has been tested successfully. The well, 1 Trusler, NW SE NW 24-58n-85w, swabbed 17 bbl. of oil per hour from Shannon. It is 90 ft. higher on structure than the discovery. McDermott has location for a third well in the area. Milo Siegel of Denver has located for a Shannon test in 29-58n-85w. The discovery is the northernmost in the Wyoming portion of the Powder River basin.

In Montana's three most active areas, developments are varied. The Texas Co. recovered sulfur water from its 2 NP G (NCT 1), C NW SW 21-16n-54e, Dawson County. Test was of the interval at 9,338-9,441 ft. The operator now is drilling below 9,575 ft. This wildcat is 7 miles north of the company's discovery in the area, and the recent Shell Oil Co. 6,700 bbl. per day completion.

At Richey, also in Dawson County, Shell has run casing on its 22-19 NP, SW SE NW 19-23n-50e, with total depth at 7,468 ft. Drill-stem tests were not believed to indicate commercial production. Southwest of the Richey discovery, Shell had a small show of oil in its 31-25-E, SE NE NW 25-23n-49e, McCone County. Total depth is 4,181 ft.

At East Poplar in Roosevelt County, C. H. Murphy, Jr., has set casing on the third well in the field, after recovering 716 ft. of oil and 165 ft. of salt water on test of the zone at 5,758-66 ft., with tool open 1 hour. In the West Poplar area, Ajax Oil Co. of Billings is preparing to retest its recently reported wildcat discovery in an attempt to get water free production. The well, 1 McGowan, C SE SW 10-29n-50e, made a reported 15 to 20 bbl. of oil per hour at the start of testing, but water broke in later in considerable quantity.

Lion Oil Co. has made location for the company's first North Dakota venture, its 1 Sedelius, SE NW 23-161n-73w, in the Dunseith area, Rolette County. A test on the northeastern flank of the Williston basin, the Lion wildcat is to go to granite, and is another in a series by various operators seeking production east of the Nesson anticline in the state.

In the Colorado portion of the Denver-Julesburg basin, Shell is reported in granite at the deep test of Mount Hope field in Logan County. The well, 16-A C. F. Green, NE NW NW 30-9n-53w is the first to go to basement in new producing pools in northeastern Colorado. Total depth is 7,802 ft., with no commercial shows reported.

COLORADO WILDCAT FAILURES

LaPlata County, Kline Area: Holgate 1 Holgate, NE NE NW 2-33n-12w, TD 1,250 ft., dry.

Logan County: Derby Oil Co. and Imperial Oil Co. 1 Skaggs, NE NW SE 33-6n-54w, TD 5,104 ft., dry. Dakota 4,826 ft., Skull Creek 4,964 ft., Lakota 5,032 ft.

Skelly Oil Co. 1 Sanders-McRoberts, SE SE NE 12-8n-53w, TD 5,299 ft., dry. "M" sand 4,988 ft., "O" sand 5,031 ft., Morrison 5,221 ft.

Vaughey & Vaughey 1 State, NE SE SE 36-12n-53w, TD 5,350 ft., dry, Greenhorn 4,914 ft., "D" sand 5,176 ft., "J" sand 5,298 ft.

Weld County: Progress Petroleum Co. 1 Hollenback NE NE NW 13-7n-62w, TD 7,537 ft., dry, Skull Creek 7,343 ft., "O" sand 7,502 ft.

WESTERN NEBRASKA WILDCAT FAILURES

Hooker County, Mullin Area: Ohio Oil Co. 1 W. B. Machlan, NE NW NE 5-23n-31w, TD 3,970 ft., dry, Morrison 2,836 ft., Red beds 3,832 ft., pre-Cambrian 3,950 ft.

Sioux County, wildcat: J. F. Stone & Son 1 E. Corbin, C SW NE 26-30n-56w, TD 4,790 ft., dry, Dakota 4,675 ft., Morrison 4,780 ft.

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MONTANA WILDCAT FAILURE

Toole County, Northwest Kevin: The Texas Co. 1 Albert Goeddertz, NE SE SW 5-35n-3w, TD 2,660 ft., dry, Sunburst 2,349 ft., Ellis 2,596 ft., Madison 2,642 ft.

WYOMING SUCCESSFUL WILDCAT

Washakie County, Worland Prospect: Gulf Oil Corp. 1 Stockham-Federal, C SE NW 2-46n-94w, TD 13,324 ft., PB 13,300 ft., flowed 572 bbl. 45°-gravity cond. with gas at rate of 12,000 M.c.f. per day on a 52/64-in. choke in 10 hours and 55 minutes from Phosphoria at 12,905-13,000 ft. Top Tensleep 13,163 ft.

WYOMING WILDCAT FAILURES

Big Horn County, Hyatville Anticline: George Noland Co., Inc. 1 Government, SW NE NE 19-49n-89w, TD 1,913 ft., dry. Tensleep 1,688 ft., Amsden 1,895 ft.

Natrona County, East Salt Creek: Wood River Oil & Ref. Co. 1 State 16, NE NE NE 16-40n-78w, TD 6,142 ft., dry., Dakota 5,972 ft., Lakota 6,053 ft., Morrison 6,117 ft.

Oklahoma

Payne County Wildcat Finds New Wilcox Pool

THE Feagin Co. has prospects of a good Wilcox sand producer at its 1-A Cundiff, a wildcat in the extreme southwest part of Payne County. Location, in the NE NW SW 9-17n-1e, is just north of the Cimarron River (Logan-Payne County line), and 1½ miles north of the comparatively new and active Southeast Coyle field, on the Logan County side of the line.

Prospective production in the Feagin wildcat is in the first Wilcox sand, whereas the Southeast Coyle field, opened last August, produces from the second Wilcox sand. The latter zone was dry in the Feagin wildcat. The prospective pay zone, the first Wilcox, was logged at 5,105 ft. The first drill-stem test, taking in an interval at 5,104-10 ft., got gas in 6 minutes and oil in 53 minutes with a final recovery of 950 ft. of oil and 100 ft. of oil and gas-cut mud with 325 ft. of water. Hole was deepened 3 ft. and another test taken, getting gas in 4½ minutes and oil and water in 75 minutes. During the latter part of the test, the well flowed at an estimated rate of 30 to 40 bbl. per hour. Final recovery was 1,300 ft. of oil and 900 ft. of water. Flowing pressure gaged 1,050 psi. Bottom-hole pressure, shut in, was 2,100 psi. Second Wilcox was topped at 5,169 ft. and drilled to 5,180 ft., where casing was bottomed.

The Southeast Coyle field is getting another good well, located on the northwest side of production in the NW NE NW 21-17n-1e, where Zephyr Petroleum Co. 2 Dodson flowed 51 bbl. of oil in the first 70 minutes. Flow the first 50 minutes was through 1-in. choke and the last 20 minutes through 22/64-in. choke. Pinched to 18/64-in. choke, flow averaged 121½ bbl. per hour. Its second Wilcox sand pay is in open hole at 5,086-95 ft.

Oil showings have been encountered in a wildcat being drilled by B. B. Burke in the extreme southwestern part of Washita County, in the western part of the state. The well, located in the C SE NE 29-8n-19w, west of the Rocky gas area, got 1,860 ft. of oil and gas-cut mud in a drill-stem test at 4,095-4,291 ft. There was no free oil, but there also was no indication of water. Showings have been passed up for the time being.

Magnolia Petroleum Co. is continuing tests at its 1 Sarah Addison, first confirmation well for the Southeast Bradley field, Grady County. Plugged back to the Hart sand after unsuccessful tests in the Springer sand, the well flowed 189 bbl. of oil in 24 hours through 1½-in. outlet. Flow was from the lower Hart zone, opposite which casing was perforated at 8,936-61 ft. Since then, a plug has been set above this zone at 8,900 ft. and casing perforated at 8,868-80 ft. for a test of the upper Hart sand. As this is written, the well is cleaning with no gage or estimate of production. Location of the well, south offset to the discovery well, is in the C SW NW 13-4n-5w. The latter well, completed earlier this year, produces from the lower Hart sand, open at 8,960-92 ft.

Testing also is under way at Phillips Petroleum Co.'s first confirmation well in the Springer and Hart sand field that company recently opened in western Garvin County. The new well, 1 Barb, C NE SW 18-3n-3w, northeast diagonal offset to the discovery well, 1 Denson, flowed 20 bbl. of oil in 2 hours through ¼-in. choke. Production, as in the discovery well, is from both sands with Springer sand open through casing perforations at 9,363-9,429 ft. and Hart sand at 8,590-8,626 ft. Total depth is 9,600 ft. with bottom of the casing at 9,557 ft. The area is 3 miles west of the Panther Creek sector of the "Golden Trend."

T. T. Eason & Co. 1 Berry estate, NW NE SE 17-18n-1e, a mile north of the Paradise pool in southwestern Payne County, flowed load oil and 24 bbl. of new oil in 3 hours while starting tests after running tubing. The well then died but later came back flowing by heads at an estimated rate of 20 to 25 bbl. per day. Pay is Bartlesville sand, opposite which casing is perforated at 4,753-65 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Beaver County: Pure Oil Co. 1 Albert, SE SE SW 16-5n-26ecm, flowed 2,700 M.c.f. of gas from Morrow at 6,718-75 ft. TD 9,233 ft.

Garvin County: Phillips Petroleum Co. 1 Denson, SW SW SW 18-3n-3w, 163 bbl. of 41.5°-gravity oil from Hart at 8,586-8,632 ft. TD 10,510 ft. PBTD 9,670 ft. Correction.

Okfuskee County: Jones-Shelborne, Inc., 1 Johnson, NE SE NE 5-13n-8e, flowed 50 bbl. oil from Cromwell 3,426-37 ft., TD 3,437 ft. Extends Micawbee pool.

Oklahoma County: Sterling Oil of Oklahoma, Inc., 1 Stephens, SE SE NW 31-14n-2w, flowed 352 bbl. oil from Bartlesville sand 5,989-6,001 ft., TD 6,001 ft. Extends NE Edmond pool.

OKLAHOMA WILDCAT FAILURES

Carter County: State Oil Co. 1 Lane, NE SE SE 31-4s-1e, dry, TD 4,542 ft.

Comanche County: W. B. Grant 1 Hanefield, NW NW NW SE 4-2n-10w, dry, TD 1,225 ft.

Garvin County: Olson Oil Co. 1 Chisholm, SW SW SW 21-3n-2e, dry, TD 2,820 ft.

Grant County: Mid-Continent Petroleum Corp. 1 Dan Bolling unit, NE NE NE 34-26n-5w, dry, TD 5,853 ft.

Kay County: O. F. Warren and Skelly 2 Huster, SW NW NW 33-29n-3e, dry, TD 3,311 ft.

Lincoln County: Mohawk Drilling Co. 1 Mayes, NW NE NE 28-13n-6e, dry, TD 4,390 ft.

K. A. Ellison 1 Ross, SW SW SW 20-16n-2e, dry, TD 5,365 ft.

Pottawatomie County: Curtis A. Kinard 1 Neal NW NW SE 14-6n-2e, dry, TD 5,400 ft.

Woods County: Beach & Talbot and L. B. Jackson 1 Hall heirs, C NE SW 15-23n-14w, dry, TD 6,990 ft.

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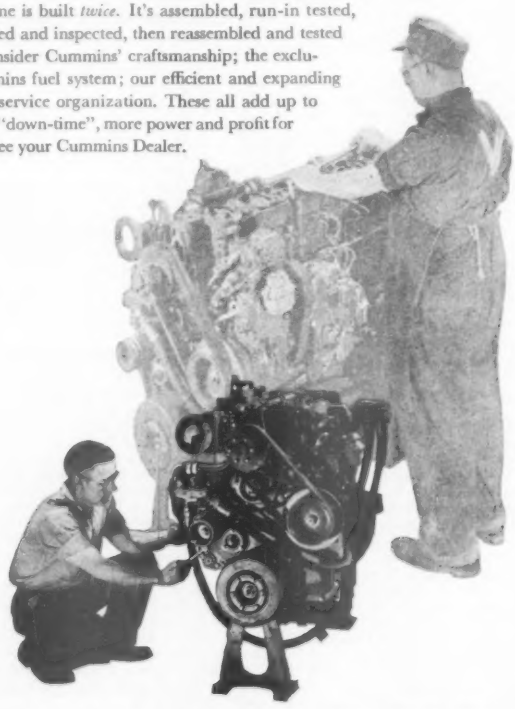

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California

Drilling Activity Running Higher Than Last Year

LOS ANGELES.—Drilling activity in California during the first half of the year probably will result in the completion of 1,250 wells, about 16 per cent more than was completed during the like period of last year. Based on 5-month figures it appears the number of dry holes and gas wells will be about the same as for the first half of 1951 and that oil completions will be 178 higher. During the past month the number of applications for drilling averaged almost 60 weekly indicating that July activity should be at a brisk pace.

Exploratory developments in the state included the completion of a new gas field discovery in Sacramento Valley and a small oil discovery in San Benito County. The latter was W. W. Holmes, Operator, 1 O'Connor in SE SE 33-17s-9e. It topped the Etchegoin (Pliocene) at 1,572 ft. and was completed as a 400-bbl. pumper in the interval between that depth and 1,937 ft.

The gas discovery was Standard Oil Co. of California 1 Simms Community in SW NE 19-7n-5e, 10 miles south of Sacramento. It was completed at 5,778-88 and 5,873-75 ft. after tests of several hours duration showed a 3,717-M.c.f. producer. The flow was through a ¼-in. choke. Pending further development the discovery was shut in.

Two new wildcats were staked in dry-gas producing areas. About 5 miles southwest of Vernalis gas production, Union Oil Co. was preparing location for 36-8 Schanabel, staked in NE SW 8-4s-6e, San Joaquin County. Near Moffat in Madera County, L. R. Lytle staked 1 Strathearn in SW SW 31-11s-15e. This 4,100-ft. test will be about ½ mile northeast of production, in the general vicinity of which the operator reportedly holds 8,700 acres.

Three wildcats staked in San Joaquin Valley included a test midway between Kern River and Kern Bluff and a ¾-mile stepout to the Temblor field. The former was British-American Oil Producing Co. 1 Roos in SE NW 11-29s-28e. The Temblor wildcat will be Ferguson & Bosworth 22 Fox O'Brien, northeast of production in NE NW 31-29s-21e. The third test was Norwood Oil Co. 5 Gardner, about 7 miles south of the town of Porterville in SW SW 35-22s-27e.

In the Los Angeles area a development was the abandoning of The Texas Co. 1 City of Fullerton. Located in the Buena Park area the test had been drilled to 10,020 ft. Another deep wildcat abandoned was Standard of California 52-19 Newhall Land & Farming, dry at 13,255 ft. The test, ½ mile east of the Castaic Junction field, found the field's three pays wet.

Southern California Petroleum Corp. may have discovered a deeper pay zone in the one-well Santa Clara field which it opened last July. Its 1 Newhall Land, in 20-4n-17w, was drilled deeper from 9,022 ft. and on a drill-stem test at 9,540 ft. gave a good oil recovery. Perforations were landed at 9,600-9,972 ft. and tubing run but while the well was being swabbed completion difficulties were encountered.

CALIFORNIA SUCCESSFUL WILDCATS

San Benito County, new field discovery 10 miles SW of Ciervo area: W. W. Holmes, Opr., 1 O'Connor, SE SE 33-17s-9e, pumped 40 bbl. per day through perf. at 1,565-1,937 ft., 26°-gravity crude, Etchegoin (Pliocene) 1,572 ft., TD 1,937 ft., elev. 1,717 ft.

CALIFORNIA UNSUCCESSFUL WILDCATS

Kern County, Edison area: Banning, Fowler & Menveg 1 Banning, 34-30s-29e, dry, TD 4,596 ft., elev. 591 ft.

Mabury area: Shell Oil Co. 37X-13 Mabury, 13-26s-18e, dry, TD 2,060 ft., elev. 655 ft.

Mount Poso area: Bradford Bishop 1-1 Murdock, 34-27s-28e, dry, TD 1,827 ft., elev. 750 ft.

Kings County, Hanford area: H. S. Sankey 1 Rockhold, 6-19s-23e, dry, TD 6,220 ft., elev. unreported.

Los Angeles County, Castaic Junction area: Standard Oil Co. 52-19 N.L.&F.6, 19-4n-16w, dry, TD 13,255 ft., elev. 1,264 ft.

Madera County, Moffat area: H. H. Magee, Opr., 1-12 Stone, 12-12s-14e, dry, TD 4,013 ft., elev. 155 ft.

Merced County, Athlone area: Shell Oil Co. 47X-19 Bliss, 19-9s-15e, dry, TD 5,493 ft.

San Benito County, Ciervo Anticline area: Standard Oil Co. 4 Nicholas, 28-16s-12e, dry, TD 1,590 ft., elev. 1,614 ft.

San Luis Obispo County, Edgar Anticline area: Hancock Oil Co. 1 SMLC-Arnold, 4-32s-19e, dry, TD 3,884 ft., elev. 2,937 ft.

Santa Barbara County, Los Olivos area: Laguna Consolidated Oil Co. 1 Dabney, 18-7n-30w, dry, TD 4,430 ft. elev. 1,407 ft.

Zaca area: Tide Water Associated Oil Co. 1 Laguna, 4-8n-31w, dry, TD 6,647 ft., elev. 1,199 ft.

Yolo County, Pleasant Creek area: Mohawk

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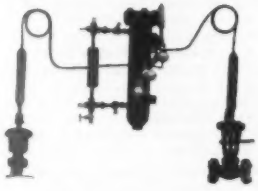

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Appalachian-Ohio

Two Rank Wildcats Located in West Virginia

PITTSBURGH.—In Union district, Pendleton County, West Virginia, Blaho Oil & Gas Co., located a rank wildcat test, 1 James Sites, elevation 2,380 ft., Horton Quadrangle. Union district, Preston County, Cumberland & Allegheny Gas Co., located 1-488 Walter Nine, elevation 2,098 ft., Kingwood Quadrangle. Harvey district, Mingo County, United Fuel Gas Co. 46-6916 Henry Closterman, gaged 2,718,000 cu. ft. gas, natural, total depth 2,950 ft. Harts Creek district, Lincoln County, United Fuel Gas Co. 6849 Fee, resulted in 1,155,000 cu. ft. gas, Brown shale, total depth 3,625 ft.

Maryland. — Garrett County: Loch Lynn Corp. 1 Lester White resulted in 143,000 cu. ft. gas, chert 3,439 ft., gas 3,469 ft., Oriskany sand 3,554 ft., total depth 3,659 ft. Heath 1 George Kite, elevation 2,402 ft., tested 125,000 cu. ft. gas, after shot, Tully 2,861 ft., chert 3,432 ft., gas 3,442 ft., Oriskany sand 3,542 ft., total depth 3,548 ft. Mid-Atlantic Oil & Gas Co. 2 Oren T. Graser, elevation 2,387 ft., topped the Oriskany sand at 3,378 ft., and is drilling at 3,407 ft. New York State Natural Gas Corp. 2-N-247 Shaw is drilling at 7,025 ft.

Pennsylvania.—Loyalhanna Township, Westmoreland County, Southwest Pennsylvania: T. W. Phillips Gas & Oil Co. 4 Atlantic Crushed Coke Co., gaged 1,580,000 cu. ft. gas, total depth 1,403 ft. Unity Township, Peoples Natural Gas Co. 4003 A. J. Dotterway, elevation 2,094 ft., is drilling at a depth of 8,155 ft. and 4008 J. R. Frola at 1,782 ft.

MARYLAND SUCCESSFUL WILDCATS

Garrett County: Loch Lynn Corp. 1 Lester White 143,000 cu. ft. gas, chert 3,439 ft., gas 3,469 ft., Oriskany sand 3,554 ft., TD 3,659 ft.

Heath 1 George Kite, elevation 2,402 ft., 125,000 cu. ft., gas, Tully 2,861 ft., chert 3,432 ft., gas 3,442 ft., Oriskany sand 3,542 ft., TD 3,548 ft.

OHIO

B. H. Putnam et al. have completed their wildcat on Russell Randolph, Section 11, Olive Township, Meigs County, as a small gasser. Oriskany sand at 4,215-42 ft. made a small gas showing natural, was treated with Hydrafrac, and then shot. The shut-in volume was 200,000 cu. ft. with a rock pressure of 1,425 psi.

Two fairly good producers were completed in the Somerset area of Perry County. Dittoe et al. 12 Walser, Section 27, Hopewell Township, made 17 bbl. natural, and 60 bbl. in 24 hours after shot. The Clinton was logged at 2,982-3,023 ft. Fairfield Drilling 3 C. E. Johnson, Section 2, Reading Township, made 15 bbl. natural and 60 bbl. in 24 hours after shooting sand at 3,000-27 ft.

Jackson Township, Knox County, has taken over from New Castle Township, Coshocton County, as the most active area in the state. Eighteen rigs are currently running, principally due to Bladensburg and Mt. Zion pools.

OHIO SUCCESSFUL WILDCAT

Meigs County, Olive Township: B. H. Putnam et al. 1 Russell Randolph, Section 11, Oriskany 4,215-42 ft., 200,000 cu. ft. of gas, TD 4,242 ft.

Canadian Fields

Heavy Crude Discovery Indicated for Saskatchewan

CALGARY.—Liberal Petroleums, Ltd., and associates have an indicated discovery of heavy crude oil in the Lower Cretaceous at their exploratory driller on farmout lands from Albercan Oil Corp. in the Palo area of Saskatchewan, about 43 miles due south of North Battleford.

This wildcat, located in the east-central sector of the province, Liberal-Canada Southern-Skyline-New Devon 2 Palo, in LSD 3, 6-37-16w3, found oil-saturated cores in the Cretaceous at around 2,360 ft. Drill-stem test of this indicated heavy-crude section, at 2,360-70 ft., yielded a recovery of 30 ft. of oil-cut mud, no water. Crew plans to drill to top of the lime, then run casing prior to perforating and testing the indicated heavy oil zone.

The team of Angelus Petroleums, Ltd., Petrol Oil & Gas Co., Ltd., and Duvex Oils & Mines, Ltd., has struck a flow of natural gas at its extension venture in the Ashmont area of northeast Alberta.

The well, Angelus-Petrol 1 Duvex, in LSD 2, 4-60-11w4, is 1 mile southwest of the Angelus 1 Ashmont that discovered gas during 1949. Gas flow rate from the Viking sand interval at 1,406-16 ft. was 517,000 cu. ft. daily at the extension success. Test in the Blairmore between 1,522 and 1,559 ft. yielded flow rates up to 2,840,000 cu. ft. per day. Coring and testing is being continued.

Phillips Petroleum Co. of Oklahoma and Husky Oil & Refining, Ltd., have obtained natural gas at their joint venture in the Newburg area, located about 4 miles southwest of Brock area gas wells, indicating an extension to that gas region in southwest Saskatchewan.

The well, Phillips-Husky 1 Newburg, in LSD 11, 2-28-21w3, is some 15 miles southeast of Kindersley town. Drill-stem test in the Viking sand interval 2,342-52 ft. flowed gas at maximum daily rate of 3,500,000 cu. ft. daily. Coring is being continued.

The Pacific Petroleums group has received a total natural gas flow rate of 2,498,000 cu. ft. daily from the mid-Triassic formation during two drill-stem tests in a 43-ft. interval at its 6 Fort St. John in the northeast sector of British Columbia.

The well, in LSD 3, 30-83-18w6, is 2 miles west of 4 Fort St. John, which also yielded gas from the mid-Triassic. Test at 4,908-28 ft., flowed gas to surface in 3 minutes, at rate of 848,000 cu. ft. daily, and yielded a 2-hour pipe recovery of 185 ft. of black, sulfury, naphtha-cut highly gassy mud. Test at 4,928-51 ft. flowed gas at maximum rate 1,650,000 cu. ft. per day. Pipe was being pulled at last report.

Husky Oil & Refining, Ltd., and Phillips Petroleum Co. have commenced swabbing operations at the team's heavy crude oil discovery well in the Hoosier area, about 33 miles northwest of Kindersley.

The well, Phillips-Husky - Hoosier, in LSD 13, 11-31-28w3, ran a 17-hour swab test at approximately 2,826-50 ft. and yielded 75 bbl. of 15.7°-gravity oil, indicating a daily rate of 105 bbl. Cut was around 3 per cent. Swabbing operations are being continued.

The oil discovery was made in the detrital zone of the Lower Cretaceous, while the Viking section at this well also gave up natural gas plus oil showings. Site is about 20 miles west-southwest of the Driver area Viking light crude oil strike and 6 miles east of the Alberta border.

CANADIAN WILDCAT FAILURES

Imperial-Alcomdale 6-29 West, LSD 6, 29-57-26w4, TD 4,243 ft.

Mill Creek-Bay 15-31 Bittern Lake, LSD 15, 31-47-22w4, TD 5,300 ft.

Hy Charger-Alsa CPR-1 Bittern Lake, LSD 5, 33-47-22w4, TD 5,200 ft.

Trans Empire-Admiral-Gateway Oils 2, LSD 6, 27-65-16w4, TD 1,834 ft.

Darfield 1 McNab, LSD 16, 34-4-18w4, TD 3,513 ft.

Gas Exploration 2 Pinhorn, LSD 14, 25-2-10w4, TD 2,785 ft.

Amerada-Crown P-F23, LSD 6, 13-27-14w4, TD 3,720 ft.

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Central Area

ILLINOIS

A ¾-mile extension of production in the Centerville area, 8 miles north of Carmi, White County, is being established by Q. B. Mitchell at his 1 Stanley, SW SE NW 1-4s-9e. The well is being completed on the pump following swabbing tests which produced at the rate of 2 bbl. of oil per hour. Pay zone is O'Hara lime, opposite which casing is perforated at 3,314-17 ft. Total depth is 3,414 ft. with bottom of the casing at 3,376 ft.

Eddie M. Self 1 Dunbar, NW NW SW 2-1n-1e, ½ mile east of production of the Raccoon Lake field, Marion County, continued to flow at the rate of 28 bbl. of oil per hour on late tests through ½-in. choke. It was showing only a trace of water. Initially, it flowed by heads at an estimated rate of 75 bbl. per hour. Its pay zone is in the Devonian at 3,374-80 ft. Total depth is 3,401 ft.
ft.

INDIANA

L. F. Wilson and Joel Vail are extending production of the Ford South pool, in Posey County, more than ¾ mile to the southeast at their 1 Fawcett, NE SW NE 34-6s-12w. Testing McClosky lime, in open hole at 2,728-34 ft., the well swabbed 67 bbl. of oil in 10 hours. Bottom of the hole at 2,734 ft. is still in the pay. The area is approximately 7 miles west of Evansville.

Discovery of a new producing area in northern Gibson County is indicated by showings encountered by Coy Oil Co. in its 1 Huey, Survey 7-1s-10w. Showings were in the Aux Vases zone, in which a drill-stem test at 1,825-62 ft. got gas in 1¾ hours and recovered 20 ft. of clean oil and 305 ft. of gas and oil-cut mud. Tester was open 2 hours. Casing has been run to the top of the indicated pay at 1,830 ft. Hole was drilled to 1,965 ft. The area is 5½ miles north of Princeton and 2 miles from any other production.

Arthur Wilson and C. Bradshaw and associates have run casing to test oil saturation encountered in the Aux Vases zone at their 1 Reed, NE NE SW 29-1n-8w, 2 miles west of Petersburg, Pike County. Saturation was logged at 1,431-57 ft. No tests were made. Hole was drilled to 1,546 ft. and casing bottomed at 1,430 ft., on top the prospective pay zone. Location is a mile east of production in the Petersburg field.

WESTERN KENTUCKY

H. E. Lopp and Thurston Cook and associates are opening what appears to be a good O'Hara lime pool in western McLean County, near the Hopkins county line (Pond River). Their 1 T. A. Ellis, the discovery well, located in 9-L-26, swabbed and flowed at an average rate of 14 bbl. per hour in initial tests of its pay zone at 2,638-44 ft. in open hole below 2,633 ft. The discovery is 7 miles southwest of Calhoun, and 2 miles east of the Pond River pool, eastern Hopkins County, opened early this year. The latter pool produces from Tar Springs sand.

EASTERN KENTUCKY

In Pilot pool of eastern Estill County and located on Billie's Fork, Lucsom Corp. has added another oiler on its H. T. Williams lease. Well 12 has been completed for 20 bbl. of oil daily from Corniferous lime topped at 979 ft. Well is bottomed at 985 ft.

United Carbon Co. has a good well at the comparatively shallow depth of 2,055 ft. at 1 W. B. Gannon in the Pike County sector of Big Sandy gas field. On open flow the test gaged 1,784,000 cu. ft. of gas daily from the Maxon sand topped at 2,001 ft. Well had a natural flow with a rock pressure of 430 psi.

Also in Big Sandy gas field, United Carbon Co. 1 Kelsie Blackburn completed as a good gas well from the Devonian black shales and bottomed at 3,208 ft. Test made 1,391,000 cu. ft. gas daily after being shot with 4,600 lb. of gelatin.

MICHIGAN

Two discovery wells were completed by Sun Oil Co. in Hamilton Township, Clare County, this week. One is an oil well in the Richfield and the other is a Marshall gas discovery well. The Richfield producer, Sun 1 Iutzi et al, NW SW SW 5-19n-3w, was rated good for 100 bbl. of oil a day after acid treatment at 5,213 ft., plug-back depth from 5,380 ft., total depth. The well was showing some water with its oil production.

The Marshall gas discovery well is the Sun Unit 1 Iutzi-Wood et al, C SE 6-19n-3w, the west 160-acre offset to the Richfield oil producer which showed gas in the Marshall enroute to the lower objective. At the gas discovery well, Marshall was logged 1,469 ft. Pay was drilled at 1,469-70, 1,473-75, and 1,477-81 ft. Well gaged at 9,600,000 cu. ft. of gas a day.

A basal Salina gas show was reported on drill-stem test at Panhandle Eastern Pipe Line Co. 1 Ringel, C SE 31-4n-15w, Casco Township wildcat, St. Clair County. A gas-showing drill-stem test was run for 30 minutes at 2,467-2,508 ft. Well was gaged good for 179,000 cu. ft. of gas at this point. Further coring and testing is in progress with no other shows reported so far.

The Lands Division, Michigan Department of Conservation, leased 22,140 acres of state-owned lands for oil and gas development at public auction in Lansing on May 23. A total of 36,126 acres was offered for leasing at this sale. Total bonus paid for these wildcat leases was $18,866, an average of 85 cents per acre.

ILLINOIS WILDCAT FAILURES

Clay County: C. E. Brehm 1 Dow et al, SE SE NW 6-3n-6e, dry, TD 2,995 ft.
C. E. Brehm 1 Rudolphi et al, NW SW NE 35-5n-8e, dry, TD 3,154 ft.
M. H. Richardson 1 Berthold, SE SE NW 23-5n-6e, dry, TD 2,906 ft.
Partlow & Cochonour 1 Brown-Fitzpatric, NW SE NW 4-5n-5e, dry, TD 2,556 ft.

Douglas County: W. W. Henigman 1 Nichols, SW NW NW 4-15n-14w, dry, TD 371 ft.

Fayette County: Milton Smith 1 Middlesworth, SE NE SW 15-7n-3e, dry, TD 1,718 ft.

Lawrence County: Big Four Oil & Gas Co. 1 Shoup, NE NE NW 34-3n-13w, dry, TD 2,503 ft.

St. Clair County: S. D. Jarvis 1 Klingelhoefer et al, S½ SE NE 35-1n-6w, dry, TD 2,195 ft.

White County: Joe Reznik 1 Elliott et al, NE SE SW 2-7s-10e, dry, TD 3,000 ft.

INDIANA WILDCAT FAILURES

Crawford County: E. K. Roggenkamp 1 Smith, SW NE SE SE 11-2s-2w, dry, TD 2,740 ft.

Spencer County: F. R. Garwood 1 Herman, SW SE SE 25-6s-7w, dry, TD 1,021 ft.

Vigo County: S. D. Jarvis 1 Gallington, SE NE SW 3-11n-10w, dry, TD 2,197 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: B. M. Heath 1 Bingemer, NE SE SW SE 12-O-22, dry, TD 2,733 ft.

McLean County: Stanford Oil Co. 1 Frisse,

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Webster County: Skiles Oil Corp. 1 Bennett-Easley, W½ SE NE SW 12-N-24, dry, TD 2,581 ft.

Joe Reznick 1 Brown, W½ SE SE NW 18-M-24, dry, TD 3,258 ft.

Delta Drilling Co. 1 Miller, NW SW NW SW 11-L-22, dry, TD 3,022 ft.

EASTERN KENTUCKY WILDCAT FAILURE

Elliott County: Raymond Long et al 1 Isaac Ison, 16-T-76, dry, TD 1,490 ft., Corniferous 1,299 ft.

MICHIGAN SUCCESSFUL WILDCATS

Clare County, Hamilton Township: Sun Oil Co. 1 Iutzi et al, NW SW SW 5-19n-3w, 100 to 125 bbl. from Richfield, TD 5,380 ft., PBTD 5,213 ft.

Sun Oil Co. Unit 1 Iutzi-Woods et al, C SE 6-19n-3w, Marshall 1,469 ft., 9,600,000 cu. ft. gas, TD 1,481 ft.

Otsego County, Chester Township: Brazos Oil & Gas Co. HE-1 State-Chester, C NE NE 15-29n-2w, 15 to 25 bbl. from basal Salina, TD 6,712 ft., PBTD 6,638

MICHIGAN WILDCAT FAILURES

Allegan County, Valley Township: Ford Oil Co. 1 Silver, NE SW SE 32-2n-14w, Traverse 1,310 ft., dry, TD 1,340 ft.

Gladwin County, Tobacco Township: Leonard Drilling Co. 1 Schultz, SE NE NE 19-17n-1w, dry in Traverse, Dundee and Detroit River "sour zone," TD 4,552 ft.

Isabella County, Broomfield Township: I. W. Hartman 1 Diehl, NW NE NE 33-14n-6w, Dundee 3,740 ft., dry, TD 3,754 ft.

Otsego County, Corwith Township: M. E. Worsley Grant, SE SE SE 31-32n-3w, dry in Richfield, TD 3,105 ft.

Eastern Texas

New Ordovician Area For Grayson County

DALLAS.—Discovery of Ordovician production in Grayson County, outside of the Sandusky area, has created considerable interest and has picked up leasing in the area around Sherman.

Standard Oil Co. of Texas 1 W. H. Baker, in the A. Humes Survey, A-522, 2½ miles northwest of Sherman, completed for 241 bbl. of 40°-gravity oil a day through ¼-in. choke from open hole at 9,385-9,427 ft. While first reports indicated the formation might be the Oil Creek sand, as found in the Sandusky area some 9 miles to the northwest, the operators said definite identity had not been established, other than it was in the Ordovician.

John B. Stephens and A. O. Phillips 1 Anschultz, Titus County wildcat discovery between Talco and Pewitt Ranch fields of Titus County, completed for 204 bbl. of 18°-gravity oil a day from perforations in the Paluxy at 4,387-95 ft.

Harrison County gained a 6,700-ft. exploration test by British-American Oil Production Co. as its 1 Webb Rogers estate. Location is 8 miles northwest of Marshall in the Scottsville area, Graves and Walling Survey.

J. A. Lavender, Jr. announced plans to drill 1 J. W. Cope as a 5,300-ft. wildcat 2 miles south of the town of Toole in Henderson County. Location is on a 59-acre lease in the Thacker Vivian Survey.

A second well for the new wet-gas area eight miles south of Hallsville was in prospect

at Tom Potter 1 Laura Shaw. Drill-stem test in the lower Pettit at 6,664-6,705 ft. had gas in 3 minutes and recovered 95 ft. of distillate plus 10 ft. of mud-cut distillate. Thirty-minute shut-in pressure was 3,440 psi.

In the North Lansing area, Harrison County, Atlantic Refining Co. 1 Bowers gas unit, E. Robertson Survey, completed for 153,000,000 cu. ft. of gas, with a gas-distillate ratio of 63,000 cu. ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Angelina County: Grady Roper 1 Peavy, G. W. Browning Sur., dry, TD 5,310 ft.
Harrison County: LaGloria Corp. 1 Cargill, Daugherty & Shissum Sur., dry, TD 6,672 ft.
Nacogdoches County: Sohio Oil Co. 1 A. D. Wood, J. Y'Barbo Sur., dry, TD 8,716 ft., elev. 537 ft., base Austin 4,925 ft.
Rusk County: F. R. Jackson 1 Harry Florey, F. Blanchard Sur., dry, TD 5,703 ft., Woodbine 3,830 ft., Paluxy 5,430 ft.
Upshur County: Sun Tex Drilling Co. 1 Guest, S. Powell Sur., dry, TD 5,602 ft.
Wood County: G. C. Glasscock 1 J. O. Donaho, W. H. Secrest Sur., dry, TD 4,351 ft.
Hollandsworth Oil Co. 1 J. E. Gaut, Wm. Clark Sur., dry, TD 6,037 ft.

Kansas

Sheridan County Wildcat Shows for Lansing Well

G-M-R OIL CO. has found substantial oil showings in the Lansing-Kansas City lime section at its 1 Mills, NW NW NE 17-9s-26w, a rank wildcat in southeastern Sheridan County, on the west flank of the Central Kansas Uplift. The well filled approximately 2,200 ft. of oil during a 45-minute drill-stem test at 4,014-34 ft. in that section. Top of the Lansing was logged at 3,830 ft. (—1,132 ft.). Hole is being deepened for a look at the Arbuckle.

Two new oil pools are indicated in northern Rush County. One is located about 3 miles south of the Schoenchen area (southern Ellis County) where Lindas Oil Co. 1 Herklotz, NW NW SW 5-16-18, got 185 ft. of oil and heavily oil-cut mud during a 60-minute drill-stem test at 3,602-14 ft. in Gorham sand, topped at 3,601 ft. Bottom of the hole at 3,614 ft. is 1 ft. in the Arbuckle, where casing has been run to test.

About 9½ miles to the east of the Lindas prospective discovery, Woody Spears 1 Williams, SW SW NE 1-16-17, flowed gas at an estimated rate of 3,000,000 cu. ft. per day and recovered 185 ft. of oil in a 60-minute drill-stem test at 3,478-88 ft. in the Lansing-Kansas City section, topped at 3,200 ft. Two previous tests higher in the pay, one at 3,459-73 ft. and the other at 3,473-78 ft., also got gas flows. In the latter a small amount of free oil also was recovered. There was no water. Operators are deepening to the Arbuckle. Nearest production is in the West Beeching pool, 4 miles to the northeast in southeastern Ellis County.

Eastern Trego County also has a prospective new oil pool where Jones, Shelburne & Farmer 1 Bongarf, C NE 31-13-21, has casing run to test oil showings logged at 4,125-55 ft. A 60-minute drill-stem test of this interval yielded 187 ft. of oil without water. Bottom of the hole is in Arbuckle, topped at 4,205 ft. The area is about 2 miles south of Riga and 5 miles south of Ogallah.

The Texas Co. has uncovered a possible new producing area in southeastern Harper County at its 1 Baker, NE SW NW 24-34-5, which recovered 60 ft. of oil and 90 ft. of heavily oil and gas-cut mud during a 60-minute drill-stem test in Lansing lime at 3,936-50 ft. Top of the section was logged at 3,764 ft. Hole has been deepened to 4,170 ft., where a twist-off is necessitating a fishing job. The location is 12 miles southeast of Anthony near the Sumner County line and 5 miles north of the Oklahoma line.

KANSAS SUCCESSFUL WILDCAT

Cowley County: T. Palmer 1 Bogner, SE SE NE 24-31s-5e, pumped 25 bbl. of oil from Mississippian 3,052-76 ft., TD 3,223 ft.

KANSAS WILDCAT FAILURES

Barber County: Barbara 1 Mills, NW NW NE 30-31s-13w, dry, TD 4,665 ft.
Barton County: Buick-E. Swearer 1 Rugan, NE NE SE 33-20s-11w, dry, TD 3,475 ft.
Nadel & Gussman 1 Ehrlich, SE SE NW 11-16s-13w, dry, TD 3,430 ft.
Butler County: Rex & Morris 1 Sherrill, SE SE NW 13-26s-3e, dry, TD 2,767 ft.
Cowley County: K. T. Weidemann 1 Cranston "C," C NW NE 30-32s-6e, dry, TD 2,257 ft.
Decatur County: Barnett Drilling Co. 1 Noone, SW SW SW 25-5s-27w, dry, TD 4,225 ft.
Gove County: Neumont 1 Lamereaux, NW NW SE 8-12s-29w, dry, TD 4,600 ft.
B&R 1 Johnson, NW NW NW 31-13s-28w, dry, TD 4,582 ft.
Ness County: Heathman 1 Elmore, NE NE NW 2-17s-21w, dry, TD 4,307 ft.
Jackson 1 Brenner-Antenan, SW SW NE 18-19s-26w, dry, TD 5,066 ft.
Reno County: M. B. Armer 1 Geesling, SE SE SE 3-26s-10w, dry, TD 4,440 ft.

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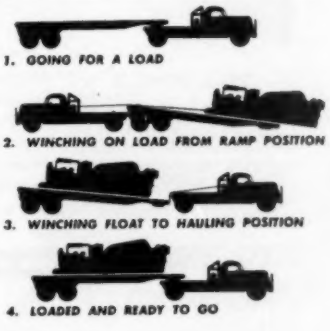

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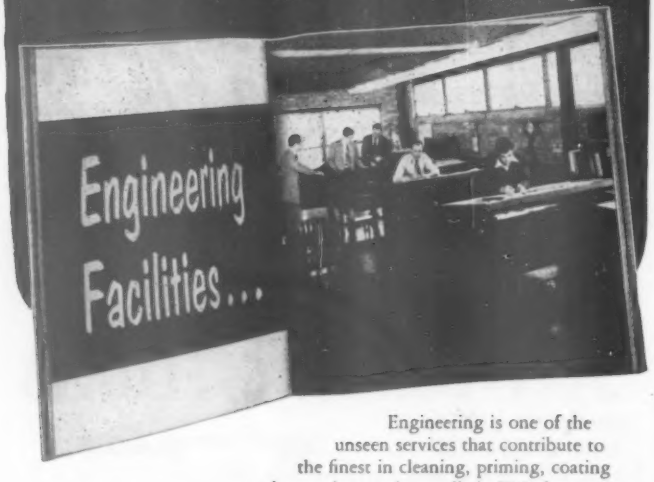

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Rooks County: Keystone 1 Raynor, SE SE NW 24-18s-20w, dry, TD 3,583 ft.
Sumner County: Aylward et al 1 Koblitz, NE SE SW 24-34s-1w, dry, TD 4,445 ft.

South Louisiana

Gas-Distillate Discovery Completed in Baptiste Area

NEW ORLEANS.—A new pool has been opened in the Baptiste area, Terrebonne Parish, with the completion of Leslie Bowling 1 La Terre, 39-19s-19e. Initial potential test of 62 bbl. of 56°-gravity distillate plus 2,500,000 cu. ft. of gas daily on a 11/64-in. choke through perforations at 10,692 to 10,710 ft. has been reported. Tubing pressure registered 3,600 psi. with casing pressure of 3,400 psi. The new gas-distillate discovery was drilled to a total depth of 13,383 ft. with 5-in. casing set at that point.

Progress Petroleum Co. has potentialed its 1 Juban, 4-7s-3e, Livingston Parish, for 130 bbl. of 50°-gravity oil daily through a 9/64-in. choke. The new oil discovery, drilled to a total depth of 9,013 ft. was completed through perforations from 8,591-97 ft. with flowing pressure of 1,400 psi. and gas-oil ratio 2,000 to 1. Casing was cemented on bottom. The new well, located in the Springville area, is located approximately 3 miles southwest of the town of Walker.

Humble Oil & Refining Co. is assured of a new gas discovery at 1 Jennie Kyle McKerall et al in the East Lake Verette area, Assumption Parish. The new operation, located in 27-13s-13e, has been drilled to a total depth of 12,208 ft. with 1-in. casing cemented at 11,525 ft. and 2½-in. tubing swung at 11,265 ft. On a 2-hour test, through perforations at 12,205-11 ft., the well flowed 1,726,000 cu. ft. of gas daily on a ⅛-in. choke. Working pressure registered 4,500 psi. The operator is continuing to test the well, which is located 6 miles southwest of Napoleonville and 1 mile northwest of the opeartor's 1 Nickolas Kafoury, a 12,087-ft. dry hole which was completed in February 1951.

A drill-stem test through perforations from 7,959-61 ft. with packer set at 7,915 ft. has been reported on Humble Oil & Refining Co. 1 State Lease 1927-Blind Bay in Plaquemines Parish. Well flowed 129.6 bbl. 54°-gravity condensate plus 1,875,000 cu. ft. of gas daily through 1-in. by 3/16-in. chokes. Working pressure of 3,100 psi. was registered. Gas-oil ratio was 14,464 to 1. The well, drilled to 8,000 ft., has 7-in. casing cemented at that point. The operator is now preparing to squeeze the perforations prior to reperforating for additional tests.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Cameron Parish: Gas-condensate discovery. Superior Oil Co. 1 Rockefeller St. Lease 2038, 4-16s-3w, TD 12,030 ft., perf. 11,242-50 ft. IP 94 bbl. cond. per day, TP 3,385 psi., CP 3,725 psi., 47.4° gravity.

SOUTH LOUISIANA WILDCAT FAILURES

Beauregard Parish: Magnolia Petroleum Co. 1 Magnolia-Four C Unit, 32-3w-9w, dry, TD 14,238 ft.
Jefferson Davis Parish: Bates & Cornell 1 W. E. Walker, 36-7s-4w, dry, TD 9,310 ft.
St. Landry Parish: Sinclair Oil & Gas Co. 2 Turner Lumber Co., 33-2s-6e, dry, TD 12,504 ft.

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THE OIL AND GAS JOURNAL
TULSA 1, OKLAHOMA

Permian Basin

Deep Terry County Well Prepared for Completion

MIDLAND.—Coroco Drilling Co. 1 Atlas Life Insurance Co., Terry County discovery, prepared to complete from both the Wolfcamp and Fusselman sections. Earlier reports identified the lower formation as the Devonian.

The well was plugged back to 12,711 ft. and perforated at 12,678-92 ft., then drill-stem tested with packer at 12,665 ft. Gas reached the top in 11 minutes and oil in 1 hour and 35 minutes, through ½-in. bottom choke. Three hourly gages were 13.11 and 10.39 bbl. of oil, with no water and without acid treatment.

In Floyd County, Standard Oil Co. of Texas 1 Minnie Adams, 8 miles southeast of Floydada, developed around 2,800 ft. of clean, 37°-gravity oil on a 2½-hour drill-stem test at 7,598-7,622 ft., thought to be Strawn limestone.

Gas had surfaced in 8 minutes and continued strong throughout the test. When pipe had been pulled down to 4,400 ft., the well started unloading oil and continued while the rest of the pipe was pulled. Operators were to core ahead 15 ft. and test. Total depth was 7,622 ft., in shale. Floyd County's only other production is in the Arick (Wolfcamp and Pennsylvanian), field which straddles the Hale-Floyd county line.

L. H. Armer has filed application to re-enter Gulf Oil Corp. 1-EE TXL, Crane County wildcat 16 miles northwest of Crane. Gulf drilled the well to 12,350 ft. and abandoned it as an Ellenburger failure. Armer planned to test the Devonian around 9,910-10,900 ft., according to reports.

A number of Spraberry extensions completed last week, including the following: In Reagan County Cities Service Oil Co. 1 J. F. Nunn completed as a discovery, or 2-mile southwest extension to the Gidney area in the northern part of the county. Daily potential through ½-in. choke was 359 bbl. of oil from perforations at 6,568-7,362 ft. Top of pay was 6,568 ft., on elevation of 2,683 ft. Location is NW NW 3-B-L&SV.

In Section 10, Block A, H&W Survey, southeast of the same area. Blackwood & Nichols 1-D Daniel completed for 262 bbl. of 40°-gravity oil a day through ½-in. choke. Top of pay was 6,357 ft., on elevation of 2,681 ft.

Completion from both the upper and lower Spraberry zones is gaining favor in some areas. In Midland County, Humble Oil & Refining Co. completed two extension wells by the above method.

Humble 2-D TXL, approximately 1 mile southeast of production in the Tex Harvey field, flowed 86.6 bbl. of oil a day through 23/64-in. choke from perforations between 6,910-85 and 7,775-7,840 ft. Top of pay was 6,910 ft. on elevation of 2,632 ft.

Humble 5-AC 2 Lillie Midkiff, in the Midkiff-Spraberry area, completed for 92 bbl. of oil a day through 24/64-in. choke, from perforations at 7,240-7,315 and 8,120-70.

In the area between Tex Harvey and Driver-Spraberry fields, Glasscock County, Ashland Oil & Refining 1-12 W. A. Hutchinson, 12-37-T4S-T&P, completed for 164 bbl. of oil a day from pay at 7,690-7,790 ft.

Ashland 4-12 W. A. Hutchinson, ¾-mile south of the above well and the same distance north of Driver field, completed for a daily flowing potential of 182 bbl. of oil a day through 28/64-in. choke, from pay at 6,944-7,130 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Runnels County: James A. Messinger 1 M. C. Dale, J. C. McKean Sur., TD 4,220 ft., elev. 1,802 ft., pay 4,172-82 ft., IP 265 bbl. 46°-gravity oil, ¼-in. choke, TP 650 psi., GOR 1,850 cu. ft.

Schleicher County: Delta Gulf Drilling Co. 1 B. M. Boyd, 9-H-GH&SA, TD 5,262 ft., elev. 2,328 ft., sand pay 4,417 ft., IP pumped 49 bbl. 34°-gravity oil.

Scurry County: Humble Oil & Refining Co. 1 James Davidson, 99-3-H&TC, TD 7,608 ft., elev. 2,405 ft., Strawn pay 7,590-7,608 ft., IP 315 bbl. 41°-gravity oil, ¼-in. choke, TP 400 psi., GOR 560 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Andrews County: Ada Oil Co. 1 Williams Seidel, 6-A42-PSL, dry, TD 4,544 ft., San Andres 4,440 ft.

J. C. Barnes 1-B Lockhart & Brown, 13-A41-PSL, dry, TD 430 ft.

Crockett County: Pure Oil Co. 1 L. B. Cox, J. H. Gibson Sur., dry, TD 1,216 ft.

Sinclair Oil & Gas Co. 1-76 University, 27-7-University, dry, TD 9,131 ft., Ellenburger 8,972 ft.

Gaines County: Honolulu Oil Co. 1-A Riley, 75-G-WTRR, dry, TD 13,282 ft., Spraberry 8,400 ft., Pennsylvanian 11,405 ft., Mississippian 12,050 ft., Silurian 13,205 ft., Woodford 13,220 ft.

Garza County: Husky Oil Co. 1 Nance, 51-6-H&GN, dry, TD 8,285 ft., Strawn

(Continued on page 161)

THE OIL AND GAS JOURNAL

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	Norman, Okla. 4350	Great Bend, Kans. ...7995
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	Allied Services, Inc., Mt. Pleasant, Michigan Telephone: 29-861	
Foreign	D. T. O'Connor, 500 Fifth Avenue, New York, N. Y.	
	Petroleum Industry Consultants, C. A., Caracas, Venez.	
	Denton - Spencer Co., Ltd., Calgary, Alberta, Canada.	

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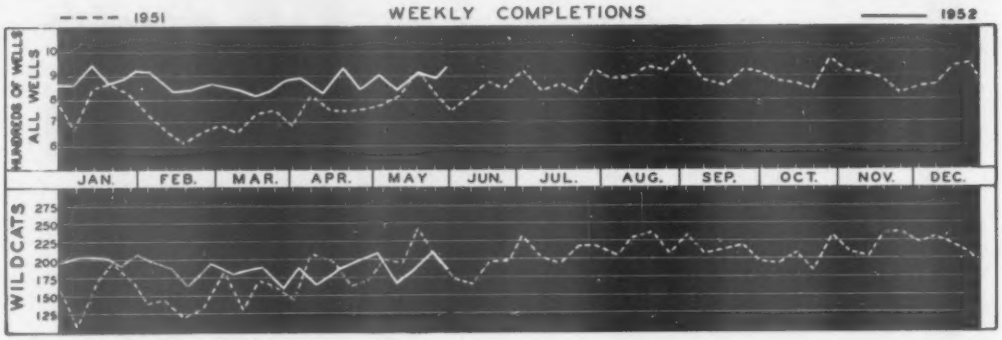


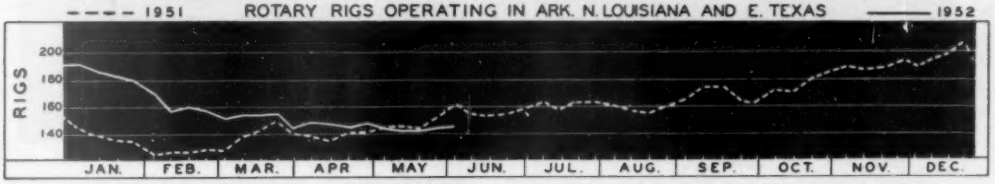
CURRENT STATISTICS

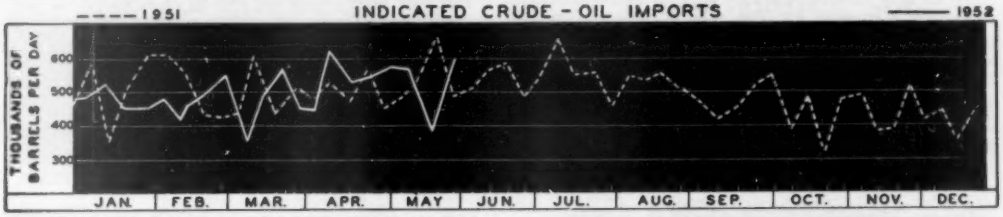
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED MAY 31, 1952

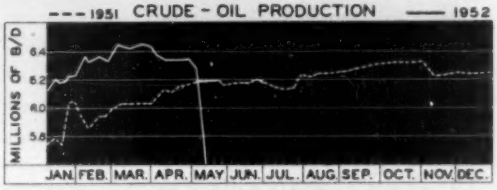
	Total of all wells					May 31		Wildcat completions and discoveries					Cumulative total, 1952				
	Comp.	Oil	Gas	Dry	Footage	1952	¶1951	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	20	10	0	*10	24,000	286	222	0	0	0	0	0	0	0	0	0	0
Pennsylvania	32	14	5	†13	64,000	693	593	0	0	0	0	0	0	0	0	2	2
West Virginia	7	1	5	1	30,760	269	242	0	0	0	0	0	0	0	2	2	4
Ohio	20	11	6	‡3	40,801	381	343	0	0	1	0	1	0	0	6	5	11
Indiana	20	8	0	12	36,437	443	393	0	0	0	3	3	14	0	2	133	149
Kentucky	33	11	5	17	72,879	537	401	0	0	0	6	6	9	0	0	93	102
Illinois	33	11	0	22	76,822	626	848	0	0	0	9	9	7	0	0	166	173
Michigan	17	9	1	‡7	57,539	293	270	2	0	1	4	7	14	0	2	101	117
Kansas	89	46	4	39	301,724	1,997	1,754	1	0	0	13	14	42	0	6	328	376
Nebraska	3	1	0	2	14,475	100	107	0	0	0	2	2	4	0	0	54	58
Oklahoma	117	67	3	‡47	461,823	2,506	2,327	2	0	0	10	12	45	1	7	262	315
Texas	366	196	21	149	1,813,697	7,531	6,796	11	2	1	79	93	347	32	54	1,569	2,002
North Central (Dist. 7-B & 9)	129	61	2	66	423,080	2,350	2,075	4	0	1	29	34	197	1	19	661	878
West (Dist. 7-C & 8)	109	78	1	30	658,168	2,332	2,066	3	0	0	19	22	64	0	3	272	339
Panhandle (Dist. 10)	14	4	6	4	60,888	287	293	0	0	0	1	1	1	0	3	21	25
Eastern (Dist. 5 & 6)	11	3	0	8	64,140	398	490	0	0	0	7	7	12	3	0	94	109
Gulf Coast (Dist. 2 & 3)	60	28	9	23	383,460	1,130	940	3	1	0	11	15	45	19	13	228	305
Southwest (Dist. 1 & 4)	43	22	3	18	223,961	1,034	932	1	1	0	12	14	28	9	16	293	346
Louisiana	47	21	3	23	348,336	930	808	0	1	0	7	8	17	9	5	102	133
Northern	21	8	1	12	88,557	490	403	0	0	0	4	4	7	0	5	45	57
Southern	26	13	2	11	259,779	440	408	0	1	0	3	4	10	9	0	57	76
Arkansas	6	4	0	2	21,064	155	149	0	0	0	2	2	4	0	0	24	28
Mississippi	12	3	0	9	95,176	157	117	0	0	0	7	7	8	1	1	62	72
Southeastern States	1	0	0	1	6,992	23	27	0	0	0	1	1	1	0	1	12	14
Montana	8	6	0	2	21,693	98	67	0	0	0	1	1	2	0	1	21	24
Wyoming	23	17	0	6	94,659	284	251	1	0	0	2	3	13	0	2	45	60
Colorado-Utah	8	2	0	6	38,062	205	96	0	0	0	5	5	11	0	6	72	89
New Mexico	25	17	4	4	156,226	414	275	1	1	0	0	2	17	1	1	40	59
California	45	33	0	12	172,421	1,059	886	1	0	0	12	13	40	0	1	198	239
North Dakota	1	1	0	0	8,685	17	2	0	0	0	0	0	3	0	0	4	7
Miscellaneous (Md.)	2	0	2	0	7,207	29	32	0	0	2	0	2	0	0	10	11	21
Total United States	935	489	59	387	3,965,478	19,033	17,006	19	4	5	163	191	598	44	107	3,306	4,055
Total previous week	896	492	51	353	3,620,267			35	1	4	170	210	579	40	102	3,143	3,864
Total June 2, 1951	742	411	37	294	2,805,002			26	2	4	142	174	583	32	112	2,989	3,716

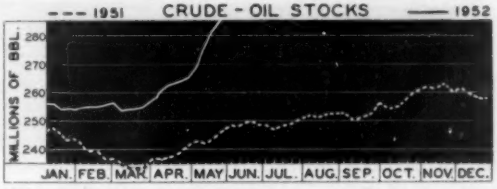
Service wells included: *10, †11, ‡2. ¶Revised.





Since information is not available from some areas concerning the effect on crude production of the excessive accumulation of crude stocks during the strike period, data on daily average production of crude oil in the United States have not been tabulated for the week ended May 31.



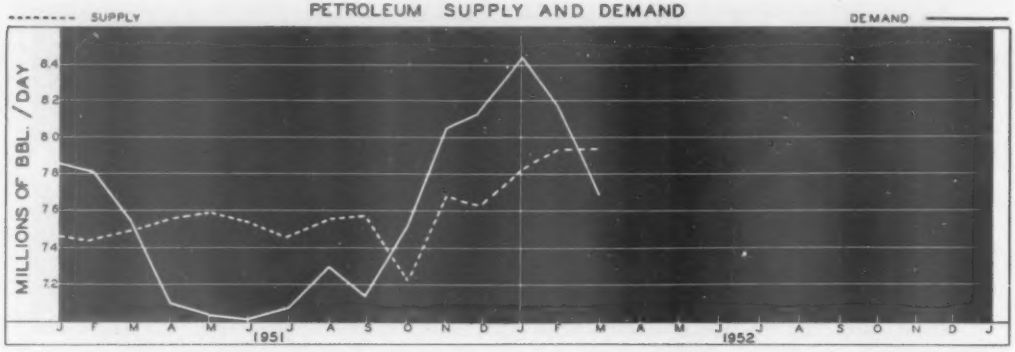


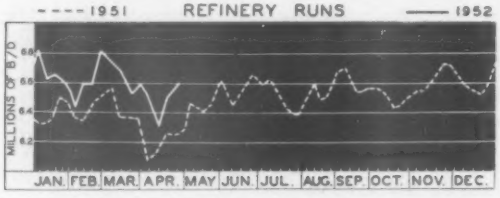
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

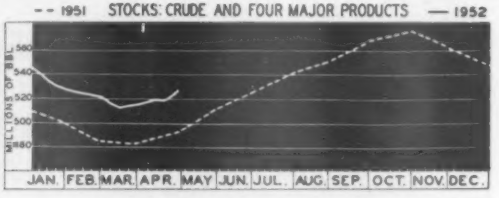
(Thousands of barrels)

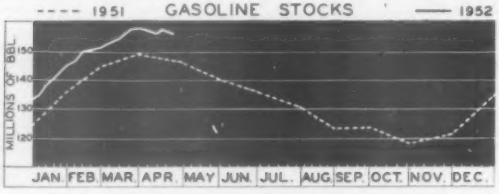
	May 24, '52	May 17, '52	May 26, '51
Pennsylvania Grade	2,445	2,485	2,061
Other Appalachian	2,056	2,057	1,525
Illinois, Indiana, Michigan	12,486	12,049	11,059
Arkansas	3,192	3,136	2,408
Louisiana	15,941	15,108	14,673
North	2,931	2,716	3,130
Gulf	13,010	12,392	11,543
Mississippi	3,763	3,336	3,298
New Mexico	7,504	7,480	6,684
Oklahoma and Kansas	43,777	44,022	38,492
Texas	140,798	138,640	113,882
East Texas proper	13,791	13,353	(†)
West Texas	61,575	61,644	(†)
Texas Gulf	31,625	30,781	(†)
Other Texas	33,807	32,862	(†)
Rocky Mountain	15,134	15,965	14,318
California	30,281	30,094	30,361
Foreign	8,436	7,409	7,639
Total	285,813	281,781	246,400

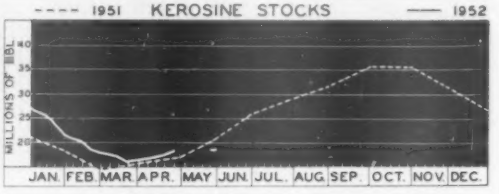
*Bureau of Mines. †Not comparable with current week.

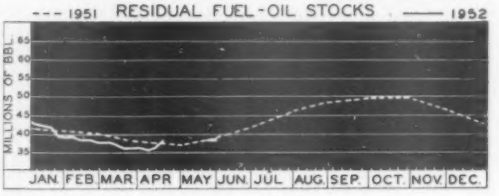










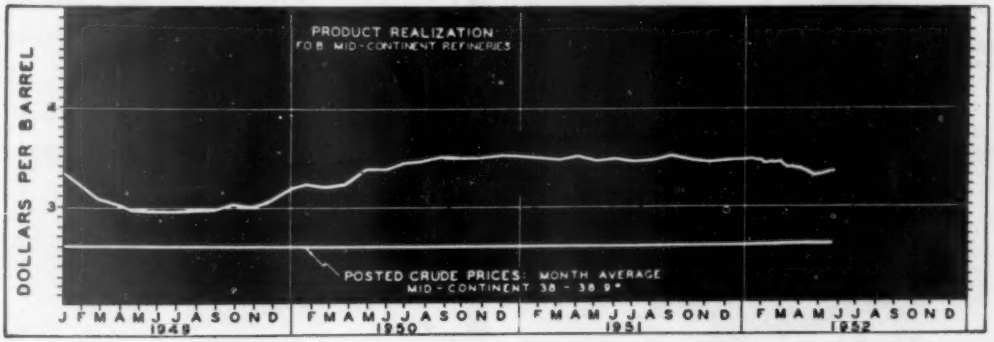


A.P.I. REFINERY REPORT, MAY 31

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks† Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, May 1951 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,059	426.2	47.4	228.3	216.7	28,229	8,085	15,459	10,604	1,041	389.3	46.6	222.5	220.4
Appalachian:														
District 1	113	48.3	3.2	15.7	14.0	3,397	394	765	557	104	46.7	6.9	12.6	9.4
District 2	36	19.1	1.6	5.7	8.0	1,589	200	292	200	76	37.7	4.4	9.6	16.7
Ind., Ill., Ky.	883	493.6	42.4	124.6	140.3	25,563	3,329	8,948	4,361	1,178	636.7	66.4	189.8	169.2
Okla., Kans., Mo.	439	240.2	9.7	97.1	40.7	12,567	1,126	7,811	1,427	506	262.5	18.4	110.5	61.2
Inland Texas	263	170.4	12.9	38.1	40.9	4,564	387	1,211	835	241	159.4	12.5	35.6	44.0
Texas Gulf Coast	915	319.0	69.7	227.0	136.7	17,239	2,589	5,806	5,574	1,564	699.1	119.1	325.9	249.1
La. Gulf Coast	555	253.7	50.9	130.9	51.3	5,994	1,680	2,329	1,798	484	233.7	48.8	115.9	60.6
N. La. and Ark.	77	29.0	7.7	23.7	6.3	2,482	585	928	190	82	31.2	7.1	18.6	7.7
Rocky Mountain:														
New Mexico	18	10.1		1.9	3.7	132		42	32	14	7.7	.2	2.7	3.6
Other Rocky Mtn.	213	95.6	4.4	47.7	42.7	4,620	335	1,255	1,100	208	100.7	4.5	39.8	43.0
California	1,002	430.7	9.0	141.9	420.3	15,518	342	6,120	11,845	938	426.4	10.2	126.2	379.7
May 31, 1952	5,573	2,535.9	258.9	1,082.6	1,121.6	121,894	19,050	50,966	38,523	6,436	3,031.1	345.1	1,209.7	1,264.6
May 24, 1952						(Not Available)								
*June 2, 1951	6,601	3,012.3	331.0	1,184.9	1,275.6	139,658	22,462	58,676	39,802					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
4
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields for current week are estimated. Realization averaged $3.34 for week ended May 24, $3.34 for previous week, and $3.47 for May 1951. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of June 4, 1952. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅜-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11⅜-11½	13.5-13.75	11¾-12
42-44 w.w. kerosine	8¾-9	10-10.1	9
No. 2 straw fuel oil	7¾-8	9-9.25	8
No. 6 residual	$1.30-1.40	$2.45-2.60	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29
200 vis., No. 3 neutral, 0-10 pp.	16.5

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX
Mid-Continent

132-134 A.M.P.	5.5

ANY prolonged steel strike will bring greater softening of residual-fuel prices in Mid-Continent and North Central areas. Group 3 prices for No. 6 fuel dropped during the last half of the heating season until normally quoted prices for northern shipment were down almost to the netback price on shipments to the Gulf Coast. In the last week of April, prices for resale were reported as low as $1.00 a barrel.

Distress material went off the market in the first week of the refinery-strike period when suppliers expected the decrease in refinery runs to bring a balance between supply and demand for residual. Current demands were easily supplied from operating plants, and residual prices started drifting back toward the prestrike level.

With a large part of the railroad market for residual lost to diesel fuel, the steel mills are important summer customers for heavy fuel produced at Mid-Continent and North Central refineries. The loss of these customers for an extended period would force additional shipments from Oklahoma refineries to the Gulf Coast.

Movement of gasoline out of primary storage is reported to be heavy in all areas following peak consumption during the Memorial Day holiday. Gasoline prices generally are at ceilings. Atlantic Refining Co. announced an increase in posted tank-wagon price to 14.7 cents a gallon for the Philadelphia area to wipe out reductions made during the period of price wars that lasted about a year. Other marketers are reported to be following.

Open market trading on the East Coast is out of the market picture until the Office of Price Stabilization reaches a decision on light-fuel ceilings. The final decision is expected by June 10. The same uncertainty about East Coast prices has reduced trading in the Gulf Coast area. Distillate movement to the East Coast is expected to jump if the recommended increase of 1.2 cents is approved.

CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93	....	....	....
19-19.9	1.98	....	....	....
20-20.9	2.03	$2.25	....	$2.12
21-21.9	2.07	2.27	....	2.14
22-22.9	2.12	2.29	....	2.16
23-23.9	2.18	2.31	....	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.	
Kettleman Hills, California*	$2.80
Louisiana:	
Beauregard Parish	2.60
Cotton Valley (distillate)	2.85
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.65
Pecos County (Yates)	2.35
Conroe	2.83
Van	2.48
Pennsylvania Grade:	
Bradford	4.25
Southwest Pennsylvania	3.82
West Virginia	3.76
Illinois Basin	2.77

*37°-37.9°.

VALUABLE MAN-HOURS ARE *LOST* by old style STEAM TRAP PIPING

Man-hours lost by old style steam trap piping, are costly. That's why hundreds of manufacturing plants are switching to Super-Silvertop Steam Traps. Three pipe connections in the head saves up to 50 minutes installation time and as many as 7 fittings. Since Super-Silvertops can be serviced without removing the trap from the line, 30 minutes time can be saved whenever you inspect or service your trap. Because Super-Silvertop valve and seats are made of longer lasting Anderloy and because the bucket is guided on a center tube eliminating bucket damage, trap failures and replacements are few and far between.

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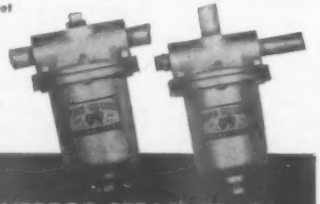

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Complete 4000 bbl. per day

REFINERY FOR SALE

A complete small refinery, on a 69-acre site, connected with two railway lines, linked by highways with Central Canadian and mid-western United States cities and only 15 miles from Great Lakes system docks, is offered for sale. The plant, which is at Petrolia, Ontario, becomes available because its owners, Canadian Oil Companies, Limited, are now bringing on stream a much larger, ultra-modern refinery at nearby Sarnia.

In addition to full equipment to process crude oil into gasolines, lubricating oils, greases and by-products, the refinery has:

- 30 buildings, the main units of which are of brick or reinforced concrete and with load-carrying walls;
- Adequate water supplies via town system from Lake Huron;
- Ample 60-cycle electrical power at low industrial rates from the Ontario Hydro-Electric Power Commission system;
- A central power plant, comprising two 500 HP water tube boilers.

REFINERY

Newer sections include Flash Topping, Cracking, Reforming and Polymerization, and associated Treating units required by Universal Oil Products Company processes. They have operated under U.O.P. inspection and recording and U.O.P. engineers have advised on maintenance. Crude capacity is 4,400 barrels per day. Thermal cracking capacity is 1,200 B.P.D. and reforming capacity 800 B.P.D.

Steel tank storage capacity, above ground, is 375,243 barrels. A 4-inch pipe line connects the storage facilities with dockside on the St. Clair River.

BUILDINGS

Total floor space of 80,000 square feet.

The office building, which also houses the plant laboratory, is a modern, well-built structure aggregating 9,000 square feet on two floors. Other buildings include:

- Garages
- Electrical Shop
- Pipefitting Shop
- Carpenter Shop
- Machine Shop
- Welding Shop

While built and operated as an oil refinery and efficient to process a relatively small crude oil throughput, the plant may be adaptable to other manufacturing processes.

Inquiries are invited and additional details can be supplied by:

Mr. G. S. Middaugh,
The Canadian Oil Companies Ltd.,
204 Richmond Street, West,
Toronto, Ontario, Canada.
Telephone EMpire 6-3031.

EQUIPMENT MEN . . . in the News

Emsco Announces Two Executive Appointments

H. H. GLEN

W. T. POWELL

Hugh H. Glen, president of Emsco Derrick & Equipment Co. since 1939, has been elected chairman of the board. William T. Powell, executive vice president, has been elected president. Both changes become effective July 1.

Powell has been associated with Emsco for the past 14 years. In 1942 he was elected vice president and placed in charge of manufacturing. Subsequently, he directed both manufacturing and engineering activities of Emsco. In December 1951 he was elected executive vice president.

Emsco manufactures oil-field equipment in plants at Houston and Garland, Tex., Los Angeles, and one in England.

BJ Service Announces Two Major Appointments

FITZPATRICK

James H. Fitzpatrick has been promoted to succeed Homer C. Karr as district superintendent of the Oakland, Calif., district for BJ Service, Inc., a subsidiary of Byron Jackson Co. R. M. (Dick) Brazier has been appointed district superintendent of the Seagraves, Tex., district.

Fitzpatrick was formerly associated with Great Lakes Steamship Co., Cleveland, Ohio, and is a licensed chief marine engineer. He has been associated with BJ Service since 1950. Starting as a marine service engineer, he was promoted in 1951 to sales engineer, and in March of this year was named to his present position.

Brazier joined BJ Service upon his release from Navy Air Force after World War II, and in 1951 was made division sales engineer working the territory out of Midland, Tex., division office. Brazier's new post includes supervision of oil-well cementing, bulk cement sales, temperature and caliper surveys, and bullet and jet perforating in the active West Texas and New Mexico oil fields. His new district includes Seagraves as well as Hobbs and Lovington, N. M.

Calumet & Hecla Appoints Kingerley to New Sales Post

A. S. KINGERLEY

E. J. Campbell, midwestern district sales manager for Wolverine Tube Division of Calumet & Hecla Consolidated Copper Co., recently announced the appointment of A. S. Kingerley as assistant midwestern district sales manager.

Kingerley has held various sales positions with Wolverine since beginning with the company in April 1927. In his new position, Kingerley's jurisdiction will cover sales in Michigan, northern Ohio, and a portion of Indiana.

Waukesha Opens Division Office in Midland, Tex.

W. L. JENKINS

A division office for the Odessa and Snyder, Tex., and Hobbs, N. M., stores of Waukesha Sales & Service, Inc., has been opened in Midland, Tex., according to an announcement by Louis M. Pearce, Jr., president of the company. W. L. Jenkins, former district manager of the Corpus Christi, Tex., branch of Waukesha Sales & Service, is division manager. Tom Gatewood is manager of the Hobbs office, and Cecil Hobby is manager at Snyder.

Ken Corp. Transfers Waldron To Bakersfield, Calif.

Ken Corp., manufacturers of Ken-Oil drilling fluid and Ken-Pak casing protectors, has announced the transfer of Jay Waldron to the company's offices at Bakersfield, Calif.

Formerly in the sales and service di-

Otis Officials Hold Meeting in Dallas

Officials of Otis Pressure Control, Inc., and its manufacturing affiliate, Otis Engineering Corp., discussed operating procedures and new tool developments at the semiannual meeting of the two firms at Dallas recently. Pictured are, front row: E. A. Kelley, Odessa, West Texas-New Mexico division manager; William B. Phillips, Dallas, personnel manager; Curtis A. Kizer, New Iberia, La., engineer-consultant; Wilbur W. Taylor, Dallas, inventory control superintendent; Harry E. Schramm, Dallas, development and research superintendent, and T. G. Garwood, Dallas, sales manager. Back row: W. E. Rich, Dallas, treasurer; John H. North, Dallas, assistant personnel manager; K. W. Robbins, Dallas, engineer-consultant; Guy W. Gant, senior sales engineer in Houston; W. L. Hill, New Iberia division manager; Bob L. Crain, Longview, Tex., division manager; Herbert C. Otis, Jr., Dallas, vice president; L. M. Wilhoit, Dallas, production manager; Mary E. Warren, Dallas, firm secretary; Harry A. Wyckoff, Oklahoma City division manager; D. E. Daffin, Houston, Gulf Coast area service manager; J. D. Tolle, Corpus Christi, Tex., division manager; Carl M. Schwab, Dallas, general service manager; Don F. Taylor, Dallas, special service department manager, and F. A. Rodgers, Houston division manager.

vision in the Los Angeles and Ventura, Calif., areas of Ken Corp., Waldron has been placed in charge of the San Joaquin Valley territory.

Savage Is Named New Jersey Sales Representative

J. A. SAVAGE

John A. Savage has been appointed petroleum industry sales representative for northern New Jersey, according to Britton L. Gordon, president, Blackmer Pump Co., Grand Rapids, Mich.

Savage was previously associated with marketing engineering departments of major oil companies. He is a graduate engineer from Newark Tech and is experienced in engineering of pump applications for the petroleum industry.

Wearly Made a Sales Vice President of Joy Mfg.

Joy Manufacturing Co., Pittsburgh, Pa., has announced the election of William L. Wearly to the post of general sales vice president in charge of all domestic sales, including Canada and Mexico.

Wearly joined Joy's engineering department in 1937 and has served successively as service manager and vice president, Coal Machinery Sales.

TOTCO Moves Doyle Tucker To Rocky Mountain Area

DOYLE TUCKER

H. H. (Pete) Peters, vice president of Technical Oil Tool Corp., has announced the transfer of Doyle Tucker to Williston, N. D.

Tucker who has been with Totco at Snyder, Tex., will continue to work under the direction of E. G. McConnell, Totco Mid-Continent manager. With Tucker, Totco now has three men serving the Rocky Mountain area through the Continental Supply Co. stores. These men are located in Casper, and Cody, Wyo., and at Williston, N. D.

Boardman Co. Opens New Tulsa Plant

Visitors and company officials attending the May 3 opening of the new building and equipment yard completed in Tulsa by The Boardman Co. are: Cy Avery, sales manager of Lock Joint Pipe Co., Tulsa; Commander Westfall, Sheffield Co., Tulsa; Harold Whitlock, vice president, Boardman, Oklahoma City; Sam Paxson, purchasing agent, H. C. Price Co., Bartlesville, Okla.; Harris Lunn, president, Boardman, Oklahoma City; Harold Wright, Tulsa Chamber of Commerce; and James J. Pulliam, manager, Tulsa division, Boardman. Boardman is distributor for Allis-Chalmers tractors, power units, motor graders, and mowers; Garwood scrapers and bulldozers; Buckeye ditchers and shovels; Baker bulldozers; Carco winches; and Tractomotive side booms and tractor loaders.

Cardwell Names Knight Clutch Division Manager

A. H. KNIGHT

A. H. Knight has recently been appointed manager, Clutch Division, Cardwell Manufacturing Co., Inc., Wichita, according to an announcement by H. W. Cardwell, president.

Knight has had many years of experience in engineering and sales, and is considered an authority on the application of heavy industrial equipment. In his new position he will direct the application of Cardwell "Flex-Disc" air friction clutches for all industries.

R. T. Jones Named Field Engineer by Chiksan Co.

R. T. JONES

Robert T. Jones, formerly sales engineer in New York and adjoining areas, has been appointed field engineer by Chiksan Co. with headquarters at the company's main plant in Brea, Calif., it has been announced by G. R. Winder, vice president.

Jones will specialize in hydraulic applications of Chiksan ball-bearing swivel joints. He will assist in actual design and layout for Chiksan customers, and will render technical service. He will cover the western portion of the United States.

Prior to joining Chiksan, Jones was tool designer at Douglas Aircraft Co. He joined Chiksan's engineering department in 1945 as product and tool engineer and in 1947 was transferred to the New York office as sales engineer.

Orbit Valve Names Mason West Coast Representative

J. C. MASON

In keeping with the expansion program of Orbit Valve Co. of Tulsa, J. Dock Mumford, vice president, has announced the appointment of John C. Mason as West Coast and export sales representative. He is well known throughout the petroleum industry, having started his oil experience in 1926 in California, and has been actively engaged in drilling, engineering, and sales throughout the world. Mason will maintain offices in Los Angeles.

Mumford also announced the opening of a new warehouse at Odessa, Tex., which is occupied entirely by Orbit Valve Co. Orbit had formerly warehoused with the Starr warehouse at Odessa.

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FOR SALE: Good 3½" and 4½" OD Drill pipe. Two EKU Waukesha's, One RL Cardwell, Hercules Engine, Tanks, Treaters, Pumping units. Rogers Pipe & Supply Co., 630 Wright Bldg., Tulsa, Oklahoma.

SPEED STAR 71 Serial #9390, Truck Mtd. Bargain for quick sale. Imed. Del. G. J. Stumpff, Box 1107, Goodyear, Ariz.

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7—CLARK GAS ENGINE GAS COMPRESSORS

1—230 H.P.—17x18x26x20
1—330 H.P.—17x18x24x20
1—230 H.P.—17x18x24x20
1—200 H.P.—16x7½x10x20
1—165 H.P.—17x6½x16x20
1—80 H.P.—16x8½x20
1—80 H.P.—16x7½x20

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Norman Strauss, Phone HArrison 1000 Salesmen on premises, contact R. V. Crisp, Phone 1419 or 610, Benton, Illinois.

NEW STEEL TUBING

10,000 feet—4" O.D.
10 gauge wall
Electric weld
20' lengths

10,000 feet—4" O.D.
9 gauge wall
Electric weld
with coating of asphalt and tar inside and out
40' lengths

60,000 feet—1" O.D.
18 gauge wall
Electric weld
20' lengths

26" O.D. NEW STEEL PIPE
Continuous Electric Weld
.281" wall
Approximately 40 joints 40' each

All or any part of the above available for immediate shipment below warehouse prices. Subject to prior sale.

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Sonken-Galamba Corp.
2nd and Riverview (X-844)
Kansas City 18, Kansas
THatcher 9243

EQUIPMENT FOR SALE

7500' OF API Full Hole 4½" Drill Pipe. Graded and tested by Sonoscope engineers. Milford Giffin, Giffin Hotel, Tel. 477, Hoisington, Kansas.

FOR SALE: 25 Gamma Magnet-o-meter, German Build. P.O. Box 1016, Wichita Falls, Texas.

WELL SERVICING UNITS — Skid type, Single Drum Cardwells, Wilsons, Allis-Chalmers, Muskogee, Keltner. Double & Single Pole Mast. Have Draw Works on long skids w/ 86' Double Pole Rotary Mast for shallow well rotary. For sizes & prices—Write General Tool & Supply Co., P. O. Box 4387, Oklahoma City.

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PIPE
All sizes; line pipe and casing, tanks, and Oilfield supplies. Edco Pipe & Supply Co., Phone 45970. P.O. Box 151, Tulsa, Oklahoma.

FOR SALE: At Oklahoma City, 3—2" used Dean-Hill high pressure 4 stage Centrifugal pumps, 60 GPM-3450 RPM, 300' Head, 3" Suction, 2" Discharge, mounted on Cast Iron base and driven by 30 HP 3 phase 60 Cycle, 440 Volt, Type FX, Frame 265S, Form A, Louis-Allis motors. Cities Service Oil Company, Patridge, Bartlesville.

ONE—45-C Star spudder with 10" A Pole. 1—13 thousand diesel motor, 1—Koehler light plant. 18" down to 5" tools. Winter house, floor walks. Drilling lines, sand lines. All tools for running rig, 12", 10" and 8" casing, all seamless pipe. These tools are running in good shape. Bad Health. Archie Newland, Yates Center, Kansas. Phone 232.

FOR SALE: Two 28-L Bucyrus Spudders, tools 15½" down to 2½" with complete combination rotary to run off of either rig. One tandem truck, one light truck, 10¾ and 8⅝" casing. Further details, write or call L. & L. Drilling Company, Phone 69, Box 67, Cross Plains, Texas.

TANKS FOR SALE

5—80,000 bbl. tanks riveted, shell and bottom only, cut down or standing, located at Norris City, Illinois.
1—80,000 bbl. tank, riveted, steel roof, cut down or standing, located at Udall, Kansas. Priced to sell.

BB&G OIL COMPANY
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35,000'—6" USED GAS LINE PIPE

18.97#, RL, No. 2 and 3 grade. Mach. cleaned and straightened. Pipe is structurally sound and has many limited uses.

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40,000 ft. 6¼" ID (6⅝" OD 13# Casing)
10,000 ft. 5⅝" ID (6" OD 10-13# Casing)
250,000 ft. ⅝ Iron and Steel Rods
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1, S-32 ($17,500.00), or 1, S-32 Special ($22,500.00) Walker-Neer Spudder. Each unit new, trailer mounted, and complete with tools. Fine, heavy equipment. Inventory available. Emanon Drilling Co., Inc., Abilene, Tex.

FOR SALE: 15000′ Rig. Bethlehem MC-950 draw works; 3 engine chain compound with double pump drive; 3 LRO Waukesha engines; 1—7¾″ X 18″ G600 Bethlehem Pump; 1—7¼″ X 16″ G300 Bethlehem Pump; Lee C. Moore 136′ Cantilever mast with 14′ substructure; 2—12″ QRC Cameron Blowout Preventors. This rig is complete with drill pipe and drill collars, ready to drill, located in Lea County, N. M. Sharp Drilling Company, Box 1271, Midland, Texas.

Gaso Duplex 4½″ x 8″ Power Pumps with Chrysler C-56 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Hockdale, Texas
AT-3427—Houston, Texas

FOR SALE OR TRADE

Or will place on lease for percentage of production 175 kw. 219 kva., 480 volt, 264 A, 3 phase—60 cycle, 1200 RPM Westinghouse A.C. Generator—Powered by 12 cycle natural gas LeRoi Engine 350 hp. mounted on steel base in one unit. Fully housed—Perfect condition. Will handle 2 or more Reda Pumps or Supply Electric current for numerous wells.

Box E-791

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

TANKS FOR SALE

Good as new, for immediate delivery. One 80,000 BBL. Seven Ring all steel tank for $25,000.00. Three 55,000 BBL. Five Ring all steel tanks for $17,500.00 each. As is where is and subject to prior sale. We will also cut down and re-erect as welded tanks either of the 55,000 BBL. tanks above for $38,500.00. Or we will cut down and re-erect the 80,000 BBL. as a welded tank for $50,250.00. These are rivited tanks and of standard construction and may be inspected now near Shreveport, La. Contact by mail or phone

We will trade any of the above tanks for Scrap iron.

CLYDE DAMPF, INC.
Box 2515, Amarillo, Texas. Phone 3-5050

USED MACHINERY

PRICED TO SELL

Cox and Sons Bucking and Threading Machine with following dies: 4 to 4½″, 5 to 6″, 7 to 8″, 9 to 10″, 11 to 12″. Quantity of engine repair shop tools, both hand and power operated, with necessary gauges.

Above equipment now located at our Abilene plant. Lincoln 300 amp. Arc Welding Machine powered by model 2-71 G-M Diesel engine. Unit is covered and mounted on trailer with pneumatic tires. Located at our Odessa plant.

USED ENGINES AND ROTARY EQUIPMENT FOR SALE

See, write, or call:

EMPIRE MACHINERY COMPANY
Abilene, Texas — **Phone 4-8196**
Odessa, Texas — **Phone 6-9161**

EQUIPMENT FOR SALE

NEED a good 4500 foot draw works? Wilson Giant, Vacuum controlled, GM 12103 Twin Six Diesel, Pump drive, Friction catheads. Excellent running condition. Located Great Bend, Kansas. C. Spitzfaden, Box 2001, Wichita, Kansas. L. D. 138.

FOR SALE: Wilson Super Winch, Waukesha power, 8″ x 7″ pole, mounted on Ford truck, complete set rod and tubing tools. Cleaveland Well Service, P.O. Box 308, Tel. 446, Luling, Texas.

FOR SALE: 20 pressure tanks 8″ diameter X 16′ high ⅜'s welded and riveted construction—with mounted feet on sides. Top and bottom equipped with gasket pressure-type heads. 20 units available each $450.00 f.o.b. western Pennsylvania. Box E-737, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Unit Rig U-34 draw works with 2—145 GKU Waukesha engines and 2—10,000 series Twin Disc Torque converters; 1—7¼″ X 14″ Gardner Denver Pump powered with a V-12 LeRoi; 96′ Lee C. Moore mast with 7′ substructure. This rig is complete with drill pipe and drill collars, ready to drill, located at Hobbs, N. M. Sharp Drilling Company, Box 1271, Midland, Texas.

USED TANKS FOR SALE: 5 Steel 55000 Barrel Riveted Tanks. Can be reset Floating Top. Price on negotiation, contact C.B.S. Steel & Forge, 3321 E. Slauson Avenue, Los Angeles 58, California. Phone LAfayette 0147.

FOR SALE: 136′ Muskogee 800,000# API Capacity Steel Derrick, 9′ 1,000,000# Sub-Structure with lumber and timbers. Good shape, drilled only 7 wells, dismantled. $7,500.00 FOB location. Grady Forbes, 6-3552, Box 2649, Odessa, Tex.

FOR SALE: Two truck-mounted Bettis steam generators; one 30 hp. on a '48 Ford C.O.E.; one 40 hp. on a '41 Chevrolet 4 by 4. Both units completely equipped. Also selling yard and building at Russell, Kansas. Going out of business. Dave Edmiston, Russell, Kans.

FOR SALE: 15000′ Rig. Bethlehem MC950 draw works; 3 engine chain compound with double pump drive; 3 LRO Waukesha engines; 1—7¾″ X 18″ G600 Bethlehem pump; 1—7¼″ X 16″ G300 Bethlehem Pump; Emsco 136′, 800,000# capacity derrick; 9′ engine sub-base; 2—10¾″ QRC Cameron 6000# test blowout preventors. This rig is complete with drill pipe and drill collars, ready to drill, located in West Texas. Sharp Drilling Company, Box 1271, Midland, Texas.

WELL drilling equipment, new or used. Spudders, rotaries, core & shot hole drills, tools, pipe, bits, blocks, pump jacks, valves. Everything for well drilling and service. Fishing tools rented. Pressey & Son, Pueblo, Colo.

INVASION PIPE—5700′ of 6″ invasion pipe with or without couplings in excellent condition; used short time for water line. Oil Field Salvage Company, Breckenridge, Tex.

PIPE FOR SALE: 25,000 ft. 8⅝″ OD, 28-lb. Line Pipe; cleaned and beveled for welding; single random lengths; #1 condition. 25,000 ft. 6⅝″ OD, 19-lb. Line Pipe, cleaned and beveled for welding; single random lengths; #1 condition. Ready for immediate shipment. Contact: The Tri-State Pipe Company, Bellaire, Ohio, Phone 42.

COMPLETE DRILLING RIG: 96′ Lee C. Moore jackknife derrick with 8′ substructure, late model R double drum Cardwell draw works powered with 226 HP—6 cylinder WAKU Waukesha motor, one 7¼ x 14 Wheeland pump, one 5 x 10 Gardner pump, 17½′ oil well rotary, 5,000′ 4½″ drill pipe, two drill collars, subs, slips, steel house, bunk house, two water pumps and two light plants. All in first-class condition. For complete information and price write Mack Well Servicing Company, 717 Wilson Building, Corpus Christi, Texas.

PIPE FOR SALE

40,000′—3½″ O.D. Standard 7.6# used line pipe—T & C
20,000′—3½″ O.D. Standard 7.6# used line pipe—P.E. Torch Cut
12,000′—4½″ O.D. Standard 10.89# used line pipe—T & C

Above pipe has all been machine cleaned, straightened and is in sound condition. Available for immediate shipment.

THE INTERSTATE PIPE & SUPPLY CO.
Marietta, Ohio
P. O. Box 548 — **Phone 2468**

EQUIPMENT FOR SALE

FOR SALE: 1—100 barrel bolted steel tank. Located near Drumright, Oklahoma. Excellent condition. Boswell-Frates Co., Tulsa, Oklahoma. 2-8758.

CABLE rig for 6,500′ on oilfield bed tandem truck. Bargain. G. M. McLaughlin, 3506 West Pikes Peak, Colo. Springs, Colo. Phone 5867J.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

NEW IMPORTED SEAMLESS,

J-55

5½″ x 14#, 15½# & 17#, Short T & C
2⅞″ EUE Tubing, 3½″ PE Tubing 4½″, 6⅝″ & 7″ Casing PE or T&C Available June 20th, Houston, Texas.

BARON TUBE COMPANY
722 Oliver St., N.W.
Atlanta, Georgia
Importers of Casing & Tubing
Phone: Atwood 9721-2

EQUIPMENT WANTED

WILL PAY highest prices for used casing used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1363, Tulsa, Oklahoma.

WE BUY well drilling equipment machines, cable tools, pipe, etc. Turn your surplus equipment into cash. Pressey & Son, Pueblo, Colorado.

WILL pay cash for your surplus equipment — Engines, Generators, and Electric Motors. Brazos Engineering Co., Inc., 224 Raines Street, Phone FAirfax 8367, Houston, Texas.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale? Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

LOSS CORPORATION

Want drilling or oil producting corporation showing operating loss over $25,000; will pay cash. Airmail or wire details to

NORMAN D. FITZGERALD
1141 Butternut Street, Abilene, Texas

SERVICES

GAS MEASUREMENT
Attention Small Gas Operators: Technical advice on gas problems, meters inspections, charts computed and purchasers billed. Please write us about this service. Box 7261, Tulsa, Okla.

REAL ESTATE

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

HELP WANTED

WANTED: Combination Safety Engineer and Metal Inspector. Southwest Refinery. Box E-681, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

WANTED: A drilling and production superintendent for gas company owning approximately 50 wells in north and south Louisiana. The man should be capable of handling workovers, drilling and general production problems of the gas wells. Prefer man in early thirties. He would locate at present in north Louisiana. Box E-781, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—SEISMOGRAPH PARTY CHIEF. Must be fully qualified. Age 27-38. A good opportunity for the right man. Box E-770, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC PERSONNEL: Party chief, surveyors, observer and shooters for oil company establishing its own geophysical department. Excellent opportunity for right men. Box E-795, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Chemical Engineers and Chemists for positions in Refinery Research and Development department, located in Tulsa. State qualifications and salary expected. Write Personnel Department, P.O. Box 381, Tulsa, Oklahoma.

WANTED

Manufacturer Sales Agent. Plastic pipe manufacturer. Pipe used in oil and agricultural industries. Set-up distributors; liberal commission. Contact

Box E-784
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

Chemical Plants Division
Blaw-Knox Construction Co.

Needs

Process Engineers
Piping Design Engineers
Mechanical specification Engineers
Planning and scheduling Engineers
For Tulsa Office

Electrical Engineers
For Tulsa and Pittsburgh, Pennsylvania Offices

Construction Field Accountants
For Assignment From Tulsa Office

Must Be Experienced in Refinery, Gasoline, Industrial and Chemical Plant Work

P. O. Box 1266 **Tulsa, Okla.**

HELP WANTED

GEOPHYSICIST: Moderately sized company with active exploration program desires geophysicist. This company presently conducting geophysical program with contract geophysicist but is planning on Geophysical Department. Only applicants under 35 years and with sufficient training and experience to act as supervisors considered. Prefer men with major company experience. Permanent location at company headquarters. Write giving experience and training in detail, and salary desired. Box E-766, The Oil and Gas Journal, Tulsa, Oklahoma.

RESERVOIR ENGINEER with over 5 years' experience, including field training. Independent California operator. Box E-748, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL Industry Employment Service, 405 Tuloma Building, Tulsa, Okla. 4-5974. Tom Robinson, owner. For Technically trained personnel. No fees. Confidential.

WANTED: Capable geologist by aggressive independent refining and marketing company now starting oil exploration program. Prefer settled, married man about 35, graduate of Oklahoma or Texas University, plus field experience and ambition. Petco Corporation, 425 Wilson Building, Dallas, Texas. Phone PRospect 1392.

PETROLEUM GEOLOGIST
Moderately sized company with active exploration program desires petroleum geologist with minimum of three years' experience, qualified to do subsurface mapping and act as assistant to district geologist in Louisiana and Mississippi. Write, giving details of experience and training and salary desired. Box E-800, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

PETROLEUM ENGINEER

For New York office of major foreign producer. Four or more years' experience in drilling, development, and production. To supervise section handling equipment procurement and oil field development engineering. Position encompasses advising management an oil-field development planning, and keeping field colleagues abreast of State-side improvements in methods and equipment. Salary commensuate with qualifications.

Write giving personal history and work experience. Please include telephone number.

Box E-801
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

OPPORTUNITIES FOR TECHNICAL REFINERY PERSONNEL for LARGE INTERNATIONAL OIL COMPANY

Entertaining applications of graduate chemical, mechanical, structural and electrical engineers for refinery engineering assignments at home and abroad.
Engineers with refinery experience and also recent graduates will be considered.

Box E-667, The Oil and Gas Journal, Tulsa, Oklahoma

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628. Ph. No. 3-3141, Hobbs, New Mexico.

PRODUCTION SUPERINTENDENT. Graduate Petroleum Engineer. 12 years responsible experience producing industry. Geological ability. Mid-Continent or Rocky Mountains. Box E-774, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST—Geologist — Geochemist, Consulting—Land and leasework. Twenty years experience in field operation and data interpretation. Desires full or part time employment in Illinois Basin. Now resident of Mattoon, Illinois. C. G. Rosaire, Box 352, Mattoon, Illinois.

GRADUATE Lawyer with 15 years' experience in land and title work, legal investigations, oil and gas lease buying, deal and contract analysis in Mid-Continent area, desires change in order to procure position with right to make royalty play for himself. For references and further information write Box E-782, The Oil and Gas Journal, Tulsa, Oklahoma.

SENIOR Process Engineer desires responsible position as operating supervisor, process engineer, or executive's technical assistant in refining, natural gasoline, or petrochemical industry. Twelve years refining experience includes catalytic, thermal cracking; catalytic, thermal reforming; coking; alkylation; polymerization; gas recovery; stabilization. Ambitious. Age 34, married, two children. Foreign locations considered. Box E-796, The Oil and Gas Journal, Tulsa, Oklahoma.

CORROSION ENGINEER Graduate. 5½ years pipe line experience. Cathodic protection bare & coated lines plus coating inspection. Desires change involving minimum of traveling. Box E-794, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Geologist, 8 years experience Louisiana and Texas Gulf Coast, 4 years as District Geologist for major company. Wants connection with either a minor or independent oil company in South Louisiana. Box E-804, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Petroleum Engineer with eleven years field experience and equipment design. Box E-793, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, B.S. degree and four years experience in Louisiana, Mississippi, and Alabama now employed with major company desires change to smaller company or independent. Box E-803, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN desires position with aggressive independent oil company or drilling company, experienced, Oklahoma attorney, references. Box E-802, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL GEOLOGIST, independent past ten years, with Major Co. ten years, now in Texas, wants summer work in Billings, Montana, or Williston Basin Subsurface. Will consider cash or interest. Box E-805, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER: Five years' sales experience alloys and specialties Texas Gulf area. Engineering degree. Industrial experience. Desire relocate Rocky Mountains, Pacific Northwest or San Francisco immediately. Will travel. Age 33. Box E-797, The Oil and Gas Journal, Tulsa, Oklahoma.

MAINTENANCE and Schedule Engineer—6 years in 35000 BPD petroleum refinery; 2 years' experience in sanitary engineering and water works. Available after July 1. Box E-780, The Oil and Gas Journal, Tulsa, Okla.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column? Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

FOR SALE: All or any part of a well selected spread of leases located on the 1000 foot to 3000 foot contours of the Williston Basin in North Dakota, Eastern Montana, and Northwestern South Dakota. These leases were carefully selected as to location. Write for descriptive list if interested. W. J. Clay, 701 W. T. Waggoner Bldg., Fort Worth, Texas; or Service Drilling Company, Kennedy Bldg., Tulsa, Oklahoma.

WILL consider selling interest large block oil leases Montana. Also consider drilling commitment. Box E-783, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE or Farm Out on Drilling Contract. 8000 acres in Trigg County, Kentucky. Located both south and west of Big Trigg Fault. C. P. Taneyhill, P. O. Box 304, Bowling Green, Ky.

PRODUCTION for Sale: Two producing wells on 40 acre lease near Tulsa. Must sacrifice immediately. Post Office Box 26, Tulsa, Oklahoma.

WE invite inquiries from persons interested in Oil and Gas Leases in Southern Alberta, North Central Montana and the Williston Basin. Box E-664, The Oil and Gas Journal, Tulsa, Oklahoma.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

PRODUCTION WANTED

Principals interested in purchasing operating producing properties in Mid-Continent Area.

P. O. Box 556
Kansas City, Missouri

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

NORTHWESTERN NORTH DAKOTA LEASES AND MINERALS

Our latest lists with prices, mailed on request. Will also buy acreage where you want it. Any place in Northwestern North Dakota. References exchanged.

BORSTAD & FITZMAURICE
Oil Properties
4th Floor 1st National Bank Bldg.
Phone 40-228 Minot, North Dakota

GET IN ON A "MAJOR" PLAY!

Major Oil Companies and a large number of progressive independents are making a great lease play in certain areas of Western Kansas, and we have some well located leases and royalties right in with and under the big company spreads. Here is the small man's chance to be in on the ground floor of a 'big company' play. Write us for full details.

ACACIA OIL & ROYALTY CO.
P. O. Box 881
Tulsa, Oklahoma

LEASE AND DRILLING BLOCKS

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

FOR SALE by Land Owner: 5 year oil & gas lease, Colorado County, Texas. Columbus Tap Survey, Abstract 153. Near production gas-distillate. $20.00 Bonus, $5.00 Rental, 1/32 OR. P.O. Box 5117 West Austin Station, Austin, Texas.

RANCHES and FARM LANDS

FOR SALE: 2080 acre ranch with 100% Oil, Gas, and Mineral Rights. 1000 acres under cultivation, 6 room Stucco house, 7 stock watering dams. In Perkins County, South Dakota. Price $22.50 per acre. Immediate possession. Address C. H. Mork, Lemmon, S. D.

RESORTS

Ranch Life in TEXAS
Outstanding Dude Ranch - scenic hill country - deluxe cottages - swimming pool - riding - hunting - fishing - sports. Modern Airport, complete aviation service.
Write for folder, rates.
Flying L Ranch

FOR SALE MAPS

*** NEW WILLISTON BASIN MAPS ***

NORTH DAKOTA - MONTANA — Complete County Ownership Maps. Showing Up-To-Date Fee Lease, Well Data. Scale: 1" = 4000'. Price: Paper, $15.00; Cloth, $25.00. Also Available: Williston Basin Map—State Maps—and Area Ownership Maps.

(For Details Write to)

Austin Map Co., Fort Worth 2, Texas
509 Neil P. Anderson Bldg. FO-6876

WILLISTON BASIN MAPS

JUST COMPLETED

COVERING: North Dakota, South Dakota, East Montana, Northeast Wyoming.

SHOWING: Structures, Township and Range, County Outline, County Seats. All wells drilled or drilling. Total depths, Completion Dates, Operators' names. Size 42" x 54".

Price $8.00 Paper, Linen $17.50

Individual County Ownership and Lease Maps

(Twenty-three county maps in stages of completion in the Basin.)

Scale: 1 inch equals 4,000 feet

Published and for sale by

NORTHWEST MAPPING CO.
117½ Fourth Street Phone 3457
Bismarck, North Dakota

OWNERSHIP MAPS

All of Eastern Montana in Williston Basin

These maps are up to date and show all federal, State, Fee Landowners and Northern Pacific Railway Oil & Gas rights. All Oil & Gas Lease with expiration dates indicated. All federal Oil & Gas leases and applications. All lots, rivers, county boundaries, sections, townships, roads and towns. All producing wells and dry holes.

We now have available all or parts of Daniels, Sheridan, Roosevelt, Richland, McCone, Dawson, Prairie, Wibaux, Custer, Fallon and Carter Counties in Montana. All producing areas and drilling wells in Eastern Montana now mapped.

Immediate delivery. Send for listing or Phone:

EDWIN Z. SNYDER MAP SERVICE
313 Treasure State Bldg.
Billings, Montana
P. O. Box 1648 Phone 9-1824

ROYALTIES

WILLISTON BASIN ROYALTIES

Dealers in Montana royalties since 1921, we now specialize in royalties under major company leases in the Montana portion of the Williston Basin. For information on our method of operation, write LANDOWNERS ROYALTIES COMPANY, Box 1225, Great Falls, Montana.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

PRODUCTION

Producing landowners royalty and producing leases. Any amount, any area. Confidential information required and given.

A 1 Bank References

COMBEST ROYALTY COMPANY
825-826 Amarillo Building
Amarillo, Texas

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1906. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES

COMPANY with new warehouse and office facilities in Odessa and well established with Permian Basin Drilling and Production Accounts desires to represent manufacturer of production or drilling specialities. A more complete description of company's facilities and sales potential can be obtained by writing Box 2466, Odessa, Texas.

MANUFACTURERS! A well established company with office and warehouse in Odessa, Texas, maintaining an experienced sales force in close contact with drilling, production, and supply companies of the entire Permian Basin, desires to represent manufacturer of highest quality oil field specialties. Address Box E-787, The Oil and Gas Journal, Tulsa, Okla.

MANUFACTURER of well established line of drilling equipment desires representation in Oklahoma, Kansas, Illinois, and Rocky Mountain areas through Manufacturers Agent. Send full particulars. P. O. Box 1436, Houston, Tex.

Pan-Am to Install Boiler From Damaged Navy Vessel

NEW ORLEANS.—A 55-ton boiler from a battle-damaged U. S. Navy destroyer will be included as part of the power plant in the refinery expansion of Pan-Am Southern's Destrehan, La., plant.

The boiler, capable of developing 80,000 lb. of steam per hour, was undamaged when the U.S.S. Hadley was bombed and practically destroyed by three suicide planes off Okinawa during World War II. The ship was returned to the states and scrapped, but the boiler was salvaged and will find new service at Destrehan.

Pan-Am is undergoing a major expansion at Destrehan which will raise the plant's capacity from 15,000 to 30,000 bbl. per day and result in a complete balanced refinery.

ADVERTISERS

Acme Fishing Tool Co. 120
Advertising Council, The 147
Aluminum Co. of America 118
American Car and Foundry Company 14
American Locomotive Company 112
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Anchor Petroleum Company 44
Anderson Co., The V. D. 154
Babcock & Wilcox Tube Company, The 73
Baird Mfg. Co. 144
Baker Oil Tools, Inc. 42
Baroid Sales Division, National Lead Company 33
Beaumont Iron Works Co. 9
Beech Aircraft Corp. 8
Bendix Aviation Corporation 26
Bethlehem Steel Co. 66
Black, Sivalls & Bryson, Inc. 81
Blyth & Co., Inc. 130
Brooks Paper Co. 132
Burgess Manning Company 30
Cameron Iron Works, Inc. 78, 79
Canadian Oil Companies, Ltd., The 154
Chicago & Southern Air Lines 149
Chicago Bridge & Iron Company Inside Front Cover
Classified Advertising 157, 158, 159, 160
Claymont Steel Corporation, Subsidiary of The Colorado Fuel & Iron Corporation 19
Cooper-Bessemer Corp., The 65
Crane Co. 5
Crescent Plastics, Inc. 137
Crose Manufacturing Co., Inc., M. J. 126
Cummins Engine Co., Inc. 140
Curtis & Co., Inc., W. H. 141
Dean Brothers Pumps, Inc. 127
Dearborn Chemical Co. 87
De Laval Steam Turbine Co. 29
Desco Service Co. 36
Dore, Inc., John L. 130
Drilling & Service, Inc. 148
Empire Trust Company 135
Flint Steel Corporation 129
Fluor Corporation, Ltd., The 37
Fuller Company 24
General Controls 11
General Electric Co., Electronic Dept. 28
Gilmer Company, L. H. 108
Goodrich Company, B. F. 3
Grancell, I. H. 119
Guiberson Corporation 121
Halliburton Oil Well Cementing Co. 7, 18
Harvey & Co., Ltd., G. A. 85
Hobbs Mfg. Company 145
Houston Contracting Company 126
Hughes Tool Co. Back Cover
Husky Oil Company 138
Hyatt Bearings Division, General Motors Corp. 12
Inferno Co., The 119, 141
Jacobson, E. C. 138
Keasbey & Mattison Company 27
Key Company 128
Klein & Sons, Mathias 38
Kobe, Inc., Division of Dresser Equipment Co. 104
Koppers Company, Inc. 16
Lane-Wells Company 15
Leschen & Sons Rope Co., A. 82, 83
Le Tourneau, Inc. R. G. 20, 21
Marlow Pumps 28
Martin Manufacturer, John N. 140
McKee & Co., Arthur G. 22
McNamar Boiler & Tank Co. 93
Minneapolis-Honeywell Regulator Co., Industrial Division 35
Mission Mfg. Company 75
Missouri Dredging Co. 123
Mixing Equipment Co., Inc. 110
Modern Engineering Co., Inc. 127
Monsanto Chemical Company 10
Motorola, Inc. 13
Murphy Diesel Company 6
Murphy, Frank W. 130
National Airoil Burner Co., The 130
National Tank Company 162
Nicolet Industries, Inc. 127
Norris Brothers, Inc. 126
Norris Manufacturer, Inc., W. C. 40
Oil and Gas Journal, The 149
Oil Well Supply Co. 4
Oklahoma Contracting Co. 122
Peerless Pump Division of Food Machinery & Chemical Corporation 17
Perrault Brothers 123, 141
Petroleum Distributing Co. 143
Petroleum Industry Projects 130
Pipe Line Service Corp. 148
Pittsburgh Coke & Chemical Co. 124
Procon, Incorporated 100, 101
Reading-Pratt & Cady Division of American Chain & Cable Co. 31
Reed Roller Bit Company Front Cover
Republic Rubber Division of Lee Rubber & Tire Corp. 23
Ross Heater & Mfg. Co., Inc. 25
Ross-Martin Co. 135
Scott-Rice Company 120
Socony-Vacuum Oil Co., Inc. 90
Southern Mill & Mfg. Co. 2
Standco Brake Lining Co. 120
Steel Forgings, Inc. 126
Tapecoat Company, The 122
Taylor Forge & Pipe Works 114
Tennessee Eastman Company, Division Eastman Kodak Company 106
Timken Roller Bearing Company 34
Tulsa Crating Co. 139
Underwood Corporation 142
U. S. Steel Corp. Subsidiaries 4
United States Treasury Department 136
Viking Pump Co. 144
Visco Products Co., Inc. 61
Warner Lewis Company 129
Web Wilson Oil Tools, Inc. 39, 139
Wheatley Pumps & Valves, Frank 125
Wood's Sons Co., T. B. 120
Youngstown Sheet and Tube Company Inside Back Cover

Permian Basin

(Continued from page 148)

7,601 ft., Mississippian 7,976 ft., Ellenburger 8,165 ft.

Glasscock County: Hassie Hunt Trust 1 A. R. Houston, 23-36-T2S-T&P, dry, TD 7,121 ft.

Phillips Petroleum Co. 1 Berry, 35-36-T2S-T&P, dry, TD 11,476 ft., elev. 2,644 ft., Strawn 10,173 ft., Ellenburger 11,340 ft.

Iron County: McAlister Fuel Co. 1 Sugg, 70-1-H&TC, dry, TD 8,595 ft.

King County: Burdell Oil Co. 1 W. R. Ross, Sec. 56, Blk. A. R. M. Thompson Sur., dry, TD 5,522 ft., Cisco 4,255 ft., Strawn 5,330 ft.

McCulloch County: F. H. Carpenter 2 Munson, Indianola RR Sur. 15, dry, TD 1,650 ft.

Pecos County: Hunt Oil Co. 35 Elsinore, 78-B-GC&SF, dry, TD 4,029 ft.

Runnels County: Bert Fields 1 B. Porch, H. W. Mathews Sur. 527, dry, TD 4,023 ft.

Sutton County: Luce and Renaud 1 J. P. Reiley, 13-A-GWT&P, dry, TD 4,561 ft., elev. 2,389 ft., Strawn 3,962 ft., Ellenburger 4,245 ft.

Tom Green County: Humble Oil & Refining Co. 1 Mary B. Hall, Sec. 27, Washington Co. RR Sur., dry, TD 6,000 ft., Strawn 4,942 ft.

W. C. Kinkel 1 W. C. Weddell, 68-5-H&TC, dry, TD 1,276 ft.

C. L. Norsworthy, Jr. 1 J. W. Duff, 15-21-H&TC, dry, TD 7,354 ft., elev. 2,472 ft., Strawn 7,096 ft., Ellenburger 7,220 ft.

The Texas Co. 1 H. Byrd, Sec. 875, German Emigration Sur., dry, TD 5,618 ft., Palo Pinto 5,240 ft.

TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURE

Roberts County: The Texas Co. 1 Rogers, 160-13-T&NO, dry, TD 8,899 ft., elev. 2,940 ft., Douglas 5,732 ft., Cleveland 7,240 ft., Oswego 7,520 ft., Atoka 8,791 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—The Texas Co. 1-AW State, 21-10s-37e, discovery or 2½-mile northwest extension to Echols field, completed for a daily potential of 899 bbl. of oil. The flow was based on an actual flow of 287 bbl. of oil in 7½ hours through ⅛-in. choke from perforations at 12,057-73 ft.

The same company's 1-AY State, 26-10s-37e, 2 miles southeast, developed 40 ft. of mud on a 30-minute drill-stem test at 12,060-87 ft. and was drilling ahead.

East of the Tulk area, Phillips Chemical Co. 1 State, 4-15s-32e, swabbed 56 bbl. of new oil and 176 bbl. of salt water in 14 hours after treating through perforations at 9,788-94 ft.

Atlantic Refining Co. 1 Melba Goins, 27-23s-37e, north offset to the Devonian discovery in Teague field, found water in the Ellenburger and planned to complete in the Devonian. Top of the lower formation was 9,787 ft. A previous test in the Devonian at 7,170-7,248 ft. developed a flow of 25 bbl. of oil an hour.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCATS

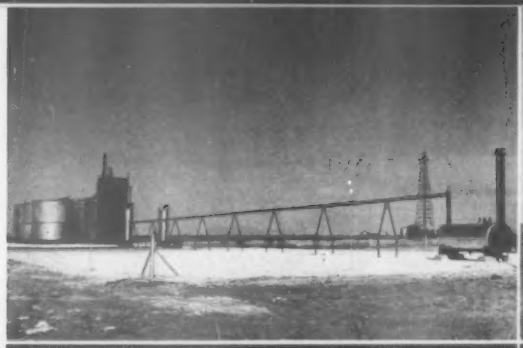
Lea County: Humble Oil & Refining Co. 1 Elliott, 1-16s-34e, TD 14,763 ft., elev. 4,078 ft., Strawn 12,000 ft., pay 12,880 ft., IP 256 bbl. 51°-gravity oil, 4,540,000 cu. ft. of gas, ¾-in. choke, TP 400 psi., GOR 17,686 cu. ft.

Sinclair Oil & Gas Co. 1 Roy Barton, 23-21s-37e, TD 7,787 ft., elev. 3,407 ft., pay 7,366 ft., IP 224 bbl. 39°-gravity oil, ¼-in. choke, TP 175 psi., GOR 1,600 cu. ft.

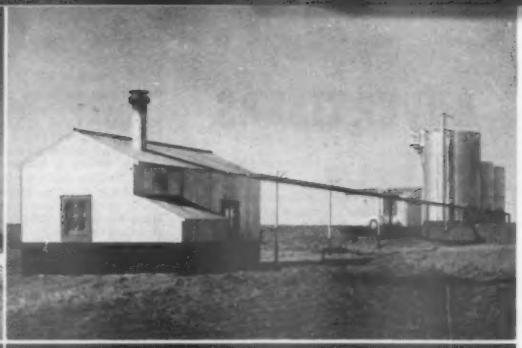
"Honest, every time I make a deal with this character—I have to dress this way before he'll discuss royalty."

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT, Washington 25, D. C. Notice is hereby given that two parcels of land in T. 20 S., R. 34 E., N.M.P.M., New Mexico, containing approximately 160 acres, within the known geologic structure of the Lynch field, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1 p. m., Eastern Standard Time, July 2, 1952, when bids will be opened. The details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, Santa Fe, New Mexico, or to this office. Marion Clawson, Director.



National Steam Generator in West Texas making steam for "U" Type Condenser located in wood treater.



National Steam Generator in Western Nebraska furnishing heat to tank coils to treat oil and keep storage at pipeline temperature.

National Steam Generator in California handling 460 bbls. of 12° API Gravity crude per day at 170° outlet temperature.

National Steam Generator in Utah keeping production in stock tanks at 110°. Crude is 37° gravity with pour point of 90°.

NATIONAL HORIZONTAL STEAM GENERATORS

(14½ PSI)

GENERAL SPECIFICATIONS

Size	Heat Cap. Rating Btu/Hr.	Model	Approx. Shipping Weight
2 x 6	250,000	B26	1150#
3 x 7½	500,000	B37	3200#
3 x 10	750,000	B310	3400#
3 x 12½	1,000,000	B312	3600#
4 x 10	1,300,000	B410	4600#
4 x 15	2,000,000	B415	6180#

The National Low Pressure Steam Generating Heaters are built and stamped in accordance with the latest edition of the ASME Low Pressure Heating Boiler Code. Standard accessories include the Code-required low water shutdown. Steam Generators may be had with or without removable firetubes. There are many other sizes than those listed at left which are available on request.

It's National

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5-6-52

REGISTER and VOTE — it's YOUR country

"It's foolish to try to be bigger than you are"

REMEMBER Aesop's fable of the frog and the ox? Told 2,500 years ago, it goes:

"Three young frogs cried to their mother that a little brother had been trampled by the largest beast in the swamp. 'Oh, no,' said the mother, 'no beast is larger than I.' And she blew herself up to show how big she really was. 'But it was much bigger,' the little ones chorused. Whereupon the vain mother inflated herself until she burst." And the moral was, "It's foolish to try to be bigger than you are."

Aside from the wisdom of the fable for each of us individually, there is solemn warning for us as a nation. Some among us seem to believe that with an unlimited supply of taxpayers' dollars America can buy anything--ease and security at home, acceptance of our ideas abroad, friendship of other peoples, even world peace.

Like the vain frog, America inflates herself more and more dangerously, trying to stretch herself to be the biggest thing in the swamp. Meanwhile the enormous beast that is the world goes its own way, scarcely affected by the vainglorious display of America's inflation. It's the same old world that was indifferent before the pomp of Egypt, Persia, Greece and Rome.

How will our present "puffing" end? Isn't it obvious that continued inflation can bring disaster? Only by a realistic policy of living within our means--not trying to be bigger than we are--can America avoid the catastrophe of Aesop's foolish frog.

YOUR SCRAP IS NEEDED — YOUNGSTOWN

The Youngstown Sheet and Tube Company

General Offices--Youngstown 1, Ohio

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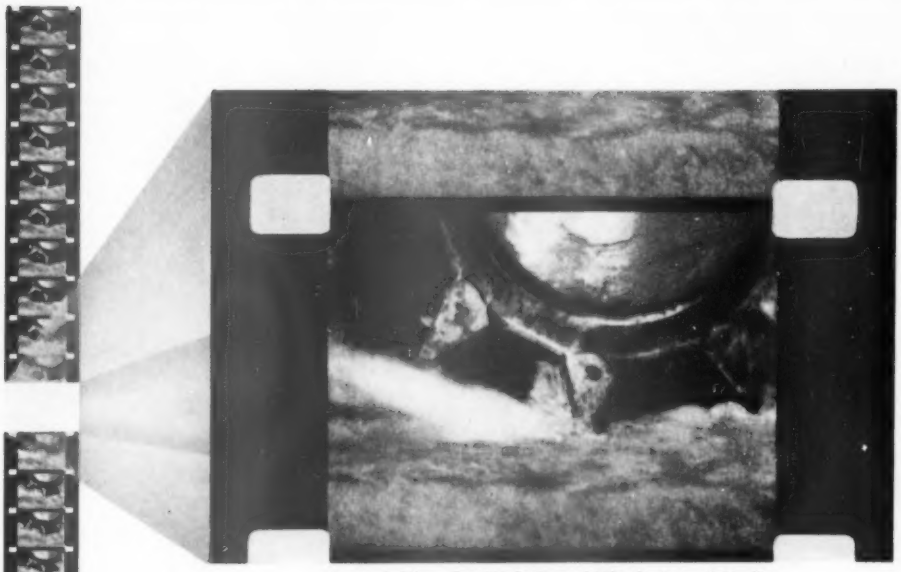
MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment.



Unretouched frame from Hughes Research Film showing explosive effect as heel tooth penetrates formation.

Hughes advances tooth action research

Knowing exactly what happens when bit teeth bite into the formation is essential in perfecting bit design.

Every means that will clarify tooth action is used by Hughes engineers. This includes the study of bottom hole patterns, data obtained from millions of bits run on thousands of rigs, and motion pictures taken with super high speed camera equipment.

This is work in which small improvements are important. For instance, a design change that leads to the removal of 1/64" more formation on each revolution of the bit can increase the penetration rate approximately five feet per hour at a rotary speed of 60 to 70 RPM.

The study of tooth action is part of HUGHES' overall research program dedicated to the idea that *improvement is a continuing process* . . . and that the perfect bit is still to be built.

HUGHES TRI-CONE® ROCK BITS